SELECTED WATER RESOURCES ABSTRACTS

VOLUME 2, NUMBER 17
SEPTEMBER 1, 1969

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UNIVERSITY OF KENTUCKY
WATER RESOURCES INSTITUTE
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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

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As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States--now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifers which are listed in the **Water Resources Thesaurus** (November 1966 edition). Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources. WRSIC is not presently prepared to furnish loan or retention copies of the publications announced.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas. Centers, and their subject coverage, now in operation are:

- Ground and surface water hydrology at the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources management at the Center for Urban Studies of the University of Chicago.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Research Institute of Rutgers University.
- Design and construction of hydraulic structures; weather modification; and evaporation control at the Bureau of Reclamation, Denver, Colorado.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangement of this bulletin are welcome.

Water Resources Scientific
Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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02 WATER CYCLE
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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
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04 WATER QUANTITY MANAGEMENT AND CONTROL
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SELECTED WATER RESOURCES ABSTRACTS

02. WATER CYCLE

2A. General

DETERMINATION OF HYDROGEOLOGICAL PARAMETERS UNDER THE CONDITIONS OF MUTUAL INTERACTION OF WATER-BEARING HORIZONS (RUSSIAN),
Moscow State Univ. (USSR). Hydrogeological Section.
For primary bibliographic entry see Field 02F.
W69-07094

THE DEVELOPMENT OF A MODEL TO EVALUATE HYDROLOGIC RISK IN A WATER RESOURCES SYSTEM,
Battelle Memorial Inst., Richland, Wash., and Texas A and M Univ., College Station.
For primary bibliographic entry see Field 06A.
W69-07100

2B. Precipitation

LEGAL STRUCTURES FOR INTERNATIONAL SUPERVISION OF WEATHER MODIFICATION TECHNIQUES,
For primary bibliographic entry see Field 06E.
W69-06916

STUDIES OF THE WINTER AND SUMMER MONSOONS IN EAST ASIA BASED ON DYNAMIC CONCEPT,
Japan Meteorological Agency (Tokyo).
Atsushi Kurashima.
The Geophys Mag, Vol 34, No 2, pp 145-235, Dec 1968. 91 p, 69 fig, 23 tab, 96 ref.

Descriptors: *Monsoons, *Dynamics, *Seasonal, *Summer, *Winter, Pressure, Air circulation, Tropical regions, Snowfall, Air masses, Rainfall, Anticyclones, Forecasting, Sea level, Frequency, Cyclones.
Identifiers: *East Asia monsoons, Winter monsoons, Summer monsoons.

The author presents a model indicating the synoptic process of the 'outbreak' of a northwestern monsoon in East Asia and shows that various flow patterns of winter monsoons in the neighborhood of Japan correspond to the respective long-wave patterns in upper westerlies. Characteristic parameters of the monsoons in North America and East Asia are discussed. The study indicates the presence of two stages in development of summer monsoons as a result of geographical and climatic conditions. (Gabriel-USGS)
W69-06977

SEASONAL VARIATIONS OF RAINFALL INTENSITIES IN VICTORIA,
Water Research Foundation (Australia).
A. Karoly.
Water Res Found of Australia Bull No 14, 1963. 55 p, 26 fig, 5 tab.

Descriptors: *Rainfall intensity, *Precipitation (Atmospheric), *Seasonal, Mathematical studies, Statistical methods, Summer, Winter, Spring, Autumn, Hydrologic data, Duration curves, Cities.
Identifiers: *Australian rainfall intensity, Victoria.

Using Melbourne rainfall for selected duration and the daily rainfall of 50 country stations, charts have been prepared giving the rainfall intensities for each of the four seasons for a return period of one year. To obtain intensities for other return periods, the one year intensity is multiplied by a frequency factor obtained from charts giving a function of the standard deviation of the logarithms (s) for the required duration (t) and return period (T). (Gabriel-USGS)
W69-07014

THE RAINS OF AUGUST AND SEPTEMBER 1968 IN THE FRENCH ALPS (FRENCH),
Center of National Scientific Research (France).
M. F. De Saintignon, and H. Vivian.
Rev de Geogr Alpine, Grenoble, Vol 57, No 2, pp 335-360, 1969. 26 p, 3 fig, 8 plate, 2 tab.

Descriptors: *Rain, *Precipitation (Atmospheric), *Seasonal, *Autumn, Winter, Winds, Meteorological data, Air temperature, Anticyclones, Climates, Climatic zones, Maps, Frequency, Mathematical studies, Statistical methods.
Identifiers: *French Alps.

A detailed analysis of rain characteristics in the French Alps was made on the basis of precipitation data recorded at many hydrologic gaging stations for the years of 1921 to 1965, 1931-1965, and 1936 to 1965. The study shows that by comparison with the hydrologic data recorded prior to 1966, the rains of August and September of 1968 were of the highest intensity in the greater part of the Northern Alps area. The statistical analysis also shows that these rains of 1968 intensity do nor occur more than 5 to 10 times in a century. (Gabriel-USGS)
W69-07123

2D. Evaporation and Transpiration

QUANTITATIVE MODEL OF MOISTURE FLOW IN THE PLANT-SOIL SYSTEM,
Hydrometeorological Service of the USSR (Moscow).
For primary bibliographic entry see Field 02G.
W69-06986

AN EXPERIMENTAL STUDY OF EVAPORATION FROM UNIFORM SOIL COLUMNS IN THE PRESENCE OF A WATER TABLE,
National and Univ. Inst. of Agriculture, Rehovoth (Israel). Volcani Inst. of Agriculture Research.
A. Hadas, and D. Hillel.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 67-74, 1968. 8 p, 3 fig, 1 tab, 13 ref.

Descriptors: *Evaporation, *Soil water movement, Water table, Water levels, Drying, Hysteresis, Salinity, Saline soils, Soil physical properties, Soil chemical properties, Permeability.
Identifiers: Potential evaporativity.

The results of laboratory experiments on evaporation from uniform profiles in the presence of a water-table are presented. Theoretical solutions describing steady-state evaporation predict that when external evaporativity is increased the soil eventually attains a maximal evaporation rate which depends upon water-table depth and profile transmissivity and which remains constant regardless of how high external evaporativity may become. Experiments showed that instead of levelling off at the maximal evaporation rate, as evaporativity was further increased the actual evaporation rates began to decrease. This may result from gradual salt accumulation, structural effects or changes in boundary conditions (i.e. the formation of a two-layer condition in which a dry surface layer eventually acts as a diffusion barrier). A comparison of the measured evaporation rates and those predicted theoretically showed that both Gardner's and Anat's theories overestimated the maximal rate, especially for shallow water-table conditions. Modification of Gardner's theory to correct for excessively high conductivity values near saturation improved the estimate somewhat. Cyclic changes in evaporativity or in water-table depth apparently induced hysteretic effects which decreased the evaporation rate.
W69-06987

RELATION OF WATER APPLICATION TO EVAPORATION AND STORAGE OF SOIL WATER,
Agricultural Research Service, Fort Collins, Colo. Soil and Water Conservation Research Div.; and Agricultural Research Service, Riverside, Calif. Soil and Water Conservation Research Div.
H. R. Gardner, and W. R. Gardner.
Soil Sci Soc Amer Proc, Vol 33, No 2, pp 192-196, Mar-Apr 1969. 5 p, 8 fig, 1 tab, 7 ref.

Descriptors: *Evaporation, *Soil water, Irrigation, Infiltration, Rainfall, Infiltrometers, Evaporators, Soil water movement, Drying, Soils, Water balance, Humidity, Water loss, Diffusion, Temperature.
Identifiers: Soil water evaporation.

Evaporation was measured from columns of Rago loam and McGrew loamy sand, to which water had been added at several rates ranging from 0.25 cm/day to 10.2 cm every 20 days. The water lost by evaporation varied from 100% of the total applied for the smallest and most frequent addition to 31.2% for the 10.2 cm of water added to McGrew soil every 20 days. The losses from repeated cycles of the individual treatments tended to approach a constant value that was less than the potential loss. As the amount added was increased for a given evaporation period, the loss tended to approach a constant value that also was much less than the potential loss. The cumulative evaporation curves were scaled to dimensionless variables and compared with a theoretical solution of the diffusivity equation for finite media. Using this scaling-comparison technique, the losses from soil with two different potential evaporations were compared with predicted curves.
W69-07089

EVAPORATION FROM BARE SOIL UNDER HIGH RADIATION CONDITIONS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Research and Regional Survey.
C. W. Rose.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 57-66, 1968. 10 p, 4 fig, 1 tab, 12 ref.

Descriptors: *Evaporation, *Soil water, *Soil water movement, Water temperature, Air temperature, Irrigation, Energy budget, Heat budget, Solar radiation, Mass transfer, Vapor pressure.
Identifiers: Evaporation from bare soil.

A theory is proposed enabling evaporation from bare soil to be calculated from measured water content and temperature profiles, provided relevant physical soil properties are determined. The theory is of general application and equates evaporation over any time period to the sum of upward liquid and vapor phase water fluxed at any depth in the soil and the decrease in water stored in the soil to that depth over the same interval. The theory is applied to data from an experiment in which profiles of water content and temperature were measured for a period of 6 days and nights following watering of bare soil by sprinkler irrigation. The mean daily shortwave radiation flux during the experiment was 617 cal/sq cm, and maximum soil temperature gradients approached 10 deg/C cm. Reasons for the somewhat complicated pattern of calculated evaporation rate are discussed, and it is shown that vapor phase transport of water is important under the conditions of this experiment. The mean ratio of evaporation by night to that of the preceding day was 0.6. One reason for this ratio being so high was the directional opposition between vapor and liquid fluxes by day and their concurrence at night. Possible errors in the calculated evaporation are considered.
W69-07135

2E. Streamflow and Runoff

FLOOD STAGES AND DISCHARGES FOR SMALL STREAMS IN TEXAS, 1967 WATER YEAR,
Geological Survey, Austin, Tex.
E. E. Schroeder.
Geol Surv Open-file Rep No 113, Mar 1969. 282 p, 2 fig, 4 tab, 6 ref.

Descriptors: *Data collections, *Hydrologic data, *Floods, *Texas, Rainfall-runoff relationships, Discharge (Water), Stage-discharge relations, Streamflow, Small watersheds, Flow measurement, Gaging stations.
Identifiers: Flood measurements (Tex).

Flood stage and discharge data for small streams in Texas in the water year 1967 are compiled. Important floods are listed. Rainfall and inflow for significant storms at a San Antonio pumping station, and runoff and rainfall data for significant storms at 151 regularly operated gaging stations are tabulated. (Knapp-USGS)
W69-06946

WATER RESOURCES OF ANTELOPE COUNTY, NEBRASKA,
Geological Survey, Washington, D. C.
V. L. Souders, and F. B. Shaffer.
Geol Surv Hydrol Invest Atlas HA-316, 3 sheets, 1969. 18 fig, 4 map, 2 photo, 2 tab.

Descriptors: *Water resources, *Surface waters, *Groundwater, *Nebraska, Water wells, Water yield, Water quality, Transmissivity, Streamflow, Hydrographs, Duration curves, Floods, Runoff, Irrigation water, Aquifers, Alluvium.
Identifiers: *Antelope County (Neb).

The water resources of Antelope County, Nebraska are discussed in a 3-sheet hydrological Atlas consisting of maps, charts, diagrams, geologic cross sections, tables, photographs, and text. Most available water in the county is in the Ogallala aquifer of Tertiary age, consisting of alluvial material, silts, and clays. Well yields of as much as 2,000 gpm are possible in much of the county, and conditions are favorable for irrigation. Water levels have not been affected to an important extent by present pumping rates. All water in the county is of excellent quality for irrigation, and except for hardness it is suitable for all other uses. (Knapp-USGS)
W69-06976

ANALYSIS OF EMPIRICAL FORMULAS FOR THE DETERMINATION OF MAXIMUM RUNOFFS FROM SMALL MOUNTAIN BASINS (POLISH),
State Inst. of Hydrology and Meteorology, Warsaw, (Poland).
Janusz Walkowicz.
Arch Hydrotech, Vol 15, No 4, Warsaw, pp 515-553, 1968. 9 fig, 23 tab, 70 ref.

Descriptors: *Mathematical studies, *Analytical techniques, *Runoff, *High water mark, *Small watersheds, Frequency, Precipitation (Atmospheric), Slopes, Flow measurement, River basins, Altitude, Sea level.
Identifiers: *Poland, Small basin runoff, Empirical formula analysis.

This investigation develops new formulas for the determination of maximum runoffs of various frequencies from small mountain basins of 1 to 100 sq km area, at altitudes over 500 m. Stream courses vary in length from 1 to 25 km, annual precipitation varies from 700 to 1500 mm, and values for the mean water-course slope range from 0.021 to 0.1. These new formulas were developed on the basis of the analysis of the formulas pertaining to the evaluation of maximum annual discharges commonly used in Poland and abroad. The formulas developed by the author were applied to the hydrological data recorded at the gaging stations on the Bober River (Poland) and the Vistula River and gave satisfactory results. (Gabriel-USGS)
W69-07010

WATER RESOURCES OF THE MISSISSIPPI HEADWATERS WATERSHED, NORTH-CENTRAL MINNESOTA,
Geological Survey, Washington, D. C.
E. L. Oakes, and L. E. Bidwell.
Geol Surv Hydrol Invest Atlas, HA-278, 4 sheets, 1968. Test, 37 fig, 4 map, 8 tab, 8 ref.

Descriptors: *Water resources, *Groundwater, *Surface waters, *Minnesota, Mississippi River, Streamflow, Water yield, Runoff, Evaporation, Water quality, Hardness (Water), Recreation, Fishing, Floods, Duration curves, Hydrographs, Hydrologic data, Aquifers, Water wells.
Identifiers: Mississippi Headwaters Watershed (Minn).

The water resources of the Mississippi Headwaters watershed, Minnesota, are discussed in a 4-sheet Hydrologic Atlas consisting of maps, charts, diagrams, tables, and text. The groundwater reservoir contains the largest quantity of water available in the area. Well yields of as much as 500 gpm are possible in most of the area. The best aquifers are buried outwash deposits. Saturated thicknesses range from less than 50 ft to over 500 ft. Water hardness ranges from 68 to 700 mg/1, and all groundwater in the area is suitable for irrigation. Surface water is abundant and not subject to large variations in flow. Average runoff is about 5.3 inches. Evaporation is about 27 inches. Facilities for year-round water-based recreation are excellent. (Knapp-USGS)
W69-07012

FLOOD PLAIN INFORMATION STUDY, JACKSON, TENNESSEE.
Corps of Engineers, Memphis, Tenn.
For primary bibliographic entry see Field 04A.
W69-07013

SIPHON METHOD FOR MEASURING WATER LEVELS,
Geological Survey, Phoenix, Ariz. Water Resources Div.; and Agricultural Research Service, Chickasha, Okla. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 07B.
W69-07086

WATER RESOURCES OF MEXICO,
Mexico National Univ, Mexico City. Instituto de Geofisica.
Rodolfo C. del Arenal.
Water Resources Bull, Vol 5, No 1, pp 19-38, Mar 1969. 20 p, 9 fig, 3 tab, 14 ref.

Descriptors: *Water resources, *Water resources development, *Surveys, Water utilization, Water supply, Precipitation (Atmospheric), Water demand, Population, Climates, Water management (Applied), Water policy.
Identifiers: *Mexico, Water resources distribution.

A general review of Mexico's water resources is presented. In Mexico, the areas of greatest water demand are generally semiarid to arid, while in areas of abundant water, population and demand are low. Irrigation is required for profitable agriculture in nearly one-half the area of the country. Water availability and water demand are shown by maps. Water availability, population densities, and storage-dam data are tabulated. Present and suggested water policies are briefly discussed. (Knapp-USGS)
W69-07098

FLOOD PLAIN INFORMATION, LAGUNA CANYON, ORANGE COUNTY, CALIFORNIA.
Corps of Engineers, Los Angeles, Calif.
For primary bibliographic entry see Field 04A.
W69-07106

FLOOD PLAIN INFORMATION, CAGUITAS RIVER, CAGUAS, PUERTO RICO.
Corps of Engineers, Jacksonville, Fla.
For primary bibliographic entry see Field 04A.
W69-07107

FLOOD PLAIN INFORMATION, OUACHITA RIVER, ARKADELPHIA, ARKANSAS.
Corps of Engineers, Vicksburg, Miss.
For primary bibliographic entry see Field 04A.
W69-07108

INVESTIGATION OF THE EFFECTS OF CHANNEL GEOMETRY AND SURFACE VELOCITY ON THE REAERATION RATE COEFFICIENT,
New Mexico State Univ., University Park. Dept. of Sanitary Engineering; and Shell Oil Co., Bakersfield, Calif.
For primary bibliographic entry see Field 05G.
W69-07116

GENERAL CHARACTERISTICS OF VENEZUELAN RIVERS (FRENCH),
Instituto de Geografia y Conservacion de Recursos Naturales, Merida (Venezuela).
Pierre Perrin.
Rev de Geogr Alpine, Grenoble, Vol 57, No 2, pp 387-404, 1969. 18 p, 6 fig, 8 ref.

Descriptors: *Rivers, *Hydrologic properties, *Topography, Precipitation (Atmospheric), Discharge (Water), High water mark, Low water mark, River basins, Water level fluctuations, Snowfall, Winds, Floods, Seasonal, Anticyclones, Streamflow, Gaging stations.
Identifiers: *Venezuelian river characteristics.

General characteristics of Venezuelian rivers were analyzed on the basis of hydrogeological and geographical data recorded at gaging stations located in the river basins of Venezuela. The analysis shows that the Venezuelian rivers are strongly affected by tropical rains and topographic relief which determines atmospheric circulation. The results of this topographical relief are that the greater river discharges are associated with the rivers issuing from the Andes mountains and Guiana with their river courses passing through very populated areas of desert character. Under these unfavorable climatic conditions often associated with the effects of anticyclones, a problem of sufficient water supply for domestic and industrial use is of foremost importance and is difficult to resolve. (Gabriel-USGS)
W69-07124

FLOOD PLAIN INFORMATION, FEATHER RIVER, NICOLAUS, CALIFORNIA.
Corps of Engineers, Sacramento, Calif.
For primary bibliographic entry see Field 04A.
W69-07127

2F. Groundwater

GEOCHEMISTRY OF SUBSURFACE BRINES.
Kansas Univ., Lawrence. Dept. of Civil Engineering; Kansas State Geological Survey, Lawrence; and Louisiana State Univ., Baton Rouge. School of Geology.
For primary bibliographic entry see Field 02K.
W69-06950

SUBSURFACE BRINES AND MINERAL EQUILIBRIA,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 02K.
W69-06952

ON THE EVOLUTION OF SUBSURFACE BRINES IN ISRAEL,
Hebrew Univ., Jerusalem (Israel). Dept. of Geology.
For primary bibliographic entry see Field 02K.
W69-06955

WATER HISTORY OF CRETACEOUS AQUIFERS, EAST TEXAS BASIN,
Albion Coll., Mich.
For primary bibliographic entry see Field 02K.
W69-06956

GEOCHEMISTRY OF SALINE SUBSURFACE WATER, SALINE COUNTY (MISSOURI),
Missouri Univ., Columbia, Dept. of Geology.
For primary bibliographic entry see Field 02K.
W69-06957

CHEMISTRY OF SOME ANADARKO BASIN BRINES CONTAINING HIGH CONCENTRATION OF IODIDE,
Bureau of Mines, Bartlesville. Okla. Bartlesville Petroleum Research Center.
For primary bibliographic entry see Field 02K.
W69-06958

MINOR ELEMENTS IN OIL-FIELD WATERS,
Shell Develop Co., Houston, Tex.; Du Pont de Nemours (E. I.) and Co., Wilmington, Del.; and Perkin-Elmer Co, Silver Spring, Md.
For primary bibliographic entry see Field 02K.
W69-06959

GEOCHEMISTRY AND ORIGIN OF FORMATION WATERS IN THE WESTERN CANADA SEDIMENTARY BASIN, 2. ALKALI METALS,
Louisiana State Univ., Baton Rouge; Research Council of Alberta, Edmonton; and Alberta Oil and Gas Conservation Board, Edmonton.
For primary bibliographic entry see Field 02K.
W69-06960

SOME CHEMICAL ALTERATIONS OF SUBSURFACE WATERS DURING DIAGENESIS,
University of Southern California, Los Angeles. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 02K.
W69-06961

GEOCHEMISTRY AND HYDRODYNAMICS OF THE PARADOX BASIN REGION, UTAH, COLORADO AND NEW MEXICO,
Geological Survey, Washington, D. C.; and Petroleum Research Corp., Denver, Colo.
For primary bibliographic entry see Field 02K.
W69-06963

WATER RESOURCES OF ANTELOPE COUNTY, NEBRASKA,
Geological Survey, Washington, D. C.
For primary bibliographic entry see Field 02E.
W69-06976

WATER RESOURCES OF THE MISSISSIPPI HEADWATERS WATERSHED, NORTH-CENTRAL MINNESOTA,
Geological Survey, Washington, D. C.
For primary bibliographic entry see Field 02E.
W69-07012

THE ABSENCE OF THRESHOLD GRADIENTS IN CLAY-WATER SYSTEMS,
Illinois Univ., Urbana. Dept. of Agronomy.
For primary bibliographic entry see Field 02G.
W69-07088

DETERMINATION OF HYDROGEOLOGICAL PARAMETERS UNDER THE CONDITIONS OF MUTUAL INTERACTION OF WATER-BEARING HORIZONS (RUSSIAN),
Moscow State Univ. (USSR). Hydrogeological Section.
I. S. Pashovsky.
Moscow Univ Herold, Ser 4, Geol, No 2, pp 100-103, Mar-Apr 1969. 4 p, 2 fig, 5 ref.

Descriptors: *Parametric hydrology, *Aquifers, *Integral circuits, Geology, Sands, Conglomerate rocks, Clays, Marl, Filtration, Density, Water balance, Fissures (Geology), Sedimentary rocks, Boreholes, Pumping, Pressure.
Identifiers: *USSR, Aquifer hydrogeologic parameters, Cisaralian area.

Hydrogeological parameters of hydraulically-associated aquifers were analyzed analytically and experimentally using laboratory models and hydrological and borehole data recorded in the Cisaralian area of the USSR. The filtration coefficients of the aquifers of the Cisaralian area were determined as varying from 0.0001 to 0.0008 m/day. The study shows that the Cisaralian coefficient values determine the mean values characterizing the total area affected by the presence of boreholes and can not be taken as representing the filtration coefficients of the clays separating the water-bearing horizons. (Gabriel-USGS)
W69-07094

THE STATUS OF GEOHYDROLOGY IN INDIA,
Geological Survey of India.
G. C. Chaterji.
Water Resources Bull, Vol 5, No 1, pp 3-18, Mar 1969. 16 p, 2 fig, 2 tab.

Descriptors: *Hydrogeology, *Surveys, Groundwater, Surface waters, Aquifers, Test holes, Irrigation, Industrial water, Irrigation water, Municipal water, Water resources development.
Identifiers: *India, Groundwater investigations.

Groundwater investigations have formed a part of the regular activities of the Geological Survey of India since its inception in 1851. Until 1930, such studies were restricted mostly to problems of rural and urban water-supply. Systematic regional geohydrological studies began in the year 1953. During the period 1953-1959 systematic hydrologic studies in India aided by drilling and testing covered about 1.5 million sq km of unconsolidated to semi-consolidated sediments, mostly in the major sedimentary basins and coastal plains. These studies revealed groundwater reservoir formations as old as the Jurassic. Since 1961 these studies have been supplemented with regional groundwater studies in extensive areas of the soft-rock mantle and also in some of the hard-rock areas. Another 70,000 sq km was covered by 1961. Basin-wide groundwater assessment, exploitation planning and conservation were the primary objectives of these studies. Currently, systematic geohydrological investigations are being continued in all the basins simultaneously with studies into specific water-supply problems for industry and agriculture. Of particular importance are those involving lignite mining operations, seepage from reservoirs into coal mines, reservoir leakage problems, effects of large-scale irrigation on groundwater regime and the fresh-saline water interface in coastal areas. The nature and origin of the thermal springs of India are also being studied intensively. Conventional geophysical methods have been applied widely to estimate thickness of sediments, delineate water-bearing zones, and detect saline water-bearing formations.
W69-07097

WATER RESOURCES OF MEXICO,
Mexico National Univ, Mexico City. Instituto de Geofisica.
For primary bibliographic entry see Field 02E.
W69-07098

KARSTIC HYDROLOGY OF VERCORS (FRENCH),
Jean Loup.
Rev de Geogr Alpine, Grenoble, Vol 57, No 2, pp 329-332, 1969. 4 p.

Descriptors: *Hydrologic properties, *Karst, *Aquifers, Groundwater movement, River basins, Caves, Dye releases, Hydrogeology, Water resources, Pollutants, Chemical analysis, Hydroelectric power, Topography, Rain, Lakes, Water balance, Discharge (Water).
Identifiers: *Vercors, France, Karstic hydrology.

Hydrogeological characteristics of the Vercors, France, karstic area are broadly discussed on the basis of the geological, geographical and hydrological data recorded in 1968. The study shows that the Vercors massif has a weak capacity for water retention in spite of the presence of large numbers of cavities and underground channels in the area. The effect of aquifers is noticeable during the dry years only, and it is probable that these aquifers are fed by snowmelts and rainstorms of considerable intensity. (Gabriel-USGS)
W69-07122

2G. Water in Soils

RELATIVE FACTORS INFLUENCING MEMBRANE FILTRATION EFFECTS IN GEOLOGIC ENVIRONMENTS,
California Univ., Berkeley. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 02K.
W69-06964

AVAILABLE AND ACCESSIBLE WATER,
Rothamsted Experimental Station, Harpenden (England).
H. L. Penman.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 29-37, 1968. 9 p, 2 fig, 6 ref.

Descriptors: *Soil water movement, *Soil-water-plant relationships, *Evapotranspiration, Diffusion, Diffusivity, Moisture, Plant growth, Root systems, Water balance.
Identifiers: Drying, Water availability.

Measurements on a loam soil gave a diffusivity ranging from 20 sq cm/day at the wilting point to 200 sq cm/day near field capacity. Starting with these data, transfer rates are calculated for a complete crop cover on such a soil, with the root system arranged in parallel sheets 40 cm deep at 2 spacings, 2 and 20 cm, with and without a deep subsoil, for 2 imposed rates of potential evaporation, 0.2 and 0.6 cm/day, and with all further resistance either wholly in the atmosphere or all in the plant. Drastic mathematical and physical assumptions are necessary. Results are curves of accumulated actual evaporation, against accumulated potential evaporation. The curves vary as greatly as published field experience. The main results are: (1) the larger potential evaporation, the smaller the value of total potential evaporation at which total actual evaporation becomes less than total potential evaporation; (2) at close spacing (dense root system) it is immaterial whether the external resistance is in the plant or in the atmosphere, but at wide spacing plant resistance (if any) can cause an early check to transpiration; (3) when there is no subsoil, the Veihmeyer concept is very nearly exact, particularly at the lower rate of potential evaporation.
W69-06984

ON THE WATER BALANCE OF GRASSLAND AND FOREST,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Soils.
J. W. Holmes, and J. S. Colville.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 39-46, 1968. 8 p, 3 fig, 3 tab, 6 ref.

Descriptors: *Forests, *Grasslands, *Water balance, *Hydrologic budget, *Soil-water-plant relationships, Evapotranspiration, Rainfall, Moisture stress, Recharge, Surface-groundwater relationships, Aquifers.
Identifiers: Australia.

Lysimeters were used for the measurement of drainage through the soil profile and the neutron moisture meter was used for the measurement of soil water content and estimation of drainage to study the water balance of grassland and forest in a region enjoying 700 mm annual rainfall. Recharge to water-table aquifer was 60 mm per year under grassland and zero under forest. Evaporation during winter and spring, which is the growing season

free from soil water stress, was greater from forest than it was from grassland by a factor of about 2. Increment of soil water during the same season was typically about 230 mm in the soil profile beneath grassland and about 120 mm in the soil profile beneath forest.
W69-06985

QUANTITATIVE MODEL OF MOISTURE FLOW IN THE PLANT-SOIL SYSTEM,
Hydrometeorological Service of the USSR (Moscow).
I. I. Sudnitzin.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 47-55, 1968. 9 p, 2 fig, 9 ref.

Descriptors: *Soil-water-plant relationships, *Soil water movement, Moisture stress, Diffusion, Water pressure, Osmotic pressure, Evapotranspiration, Transpiration, Water balance, Mathematical models.
Identifiers: Potential evapotranspiration.

A quantitative model of water movement in the soil-plant-atmosphere system is presented. The model was based on thermodynamical principles postulating the linear relationship between flux density and the potential gradient, the relationship between the hydraulic conductivity and the total soil water pressure, obtained on the basis of soil pore size distribution, and the relationship between relative transpiration and the total soil water pressure, estimated empirically in a pot experiment and confirmed by analyzing the meteorological data for many years. By this model it is possible to calculate the relationship between the water pressure in the plant roots and the soil water pressure, if the potential evapotranspiration, active root surface and some constants are known. The experimental control confirms the validity of this model as a first approximation. It appears that in the range of 0 to -15 bar, root pressure decreases more rapidly than soil water pressure and thus the water pressure head between roots and soil increases uninterruptedly. When soil water pressure becomes small, the leaf surface area becomes smaller by leaf shedding (the range of 'passive' adaptation). At a soil water pressure of -25 bar, the root to soil pressure difference becomes very small, the water flux density also becomes very small and plants die. Under given meteorological conditions the value of the pressure difference is proportional to the potential evapotranspiration.
W69-06986

AN EXPERIMENTAL STUDY OF EVAPORATION FROM UNIFORM SOIL COLUMNS IN THE PRESENCE OF A WATER TABLE,
National and Univ. Inst. of Agriculture, Rehovoth (Israel). Volcani Inst. of Agriculture Research.
For primary bibliographic entry see Field 02D.
W69-06987

THE EFFECT OF TEMPERATURE GRADIENT ON MOVEMENT OF SOIL WATER,
Slovak Academy of Sciences, Bratislava (Czechoslovakia). Inst. of Hydrology and Hydraulics.
J. Sutor, and V. Novak.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 85-93, 1968. 9 p, 4 fig, 15 ref.

Descriptors: *Evaporation, *Soil water movement, *Soil water, Temperature, Drying, Diffusion, Percolation, Heat flow, Mass transfer, Thermal stress, Moisture stress, Thermodynamics.
Identifiers: Thermal gradients, Moisture gradients.

The influence of a temperature gradient within a soil column upon the loss of water from the exposed surface of one end was investigated experimentally using a packed column 15 cm long. The surface was maintained cooler than the soil beneath it, and a set of water content profiles in the soil was obtained for the conditions; initial water content of the soil 0.21 cc per cc, temperature gradient 1 deg C/cm, mean temperature 29 deg C, bulk density of the soil 1.20 g/cc and 7 relative vapor pressures at the evaporating surface between 0.01 and 1.0. Similar experiments were performed with isothermal water movement in the soil. The evaporation was about 3 times as large, when the temperature gradient assisted the flow of water to the surface. By computation, using the experimentally determined values of temperature gradient and water flux, the coefficient for water flow under a temperature gradient was determined to be about .00003 sq cm/sec deg C with a maximum content of 0.21 cm per cm.
W69-06988

THE SIGNIFICANCE OF THE EXTERNAL WATER POTENTIAL AND OF SALT TRANSPORT TO WATER RELATIONS IN PLANTS,
California Univ., Riverside. Dept. of Soils and Plant Nutrition.
J. J. Oertli.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 95-107, 1968. 13 p, 6 fig, 1 tab, 18 ref.

Descriptors: *Soil-water-plant relationships, *Soil water movement, *Plants, Moisture stress, Thermodynamics, Thermodynamic behavior, Free energy, Chemical potential, Solutes, Osmotic pressure, Mass transfer, Salinity.
Identifiers: Water potential.

Effects of the external water potential and of solute-water interactions on plant behavior were investigated. Maintenance of turgor pressure in plants grown in external solutions of different osmolalities does not preclude a growth reduction under saline conditions through an effect of water relations. Through solute uptake, elongating cells must continuously adjust the turgor pressure in the volume they are gaining. From salt transport characteristics, an optimum concentration may be predicted at which this adjustment is most rapid. Toward both lower and higher saline concentrations, growth rates through cell elongation are reduced. It is shown that salt depletion or accumulation during xylar water flow changes requirements for osmotic adjustment in plants. It is postulated that salt burns may be the result of such an extracellular salt accumulation. Conversely extracellular salt depletion should have a beneficial effect. These changes of foliar extracellular salt concentrations are not properly considered when the osmolality of the expressed leaf sap is used to test a possible turgor adjustment. It is concluded that plant responses to saline conditions can only partly be explained by the energy status of the external water and that static and dynamic aspects of solutes in plants, both intra- and extracellular must properly be considered.
W69-06989

THE USE OF EXCHANGE ISOTHERMS TO DETERMINE DIFFUSION COEFFICIENTS IN SOIL,
Oxford Univ. (England). Soil Science Lab.
P. H. Nye.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 117-126, 1968. 10 p, 3 fig, 19 ref.

Descriptors: *Diffusion, *Soil water movement, *Solutes, *Ion transport, Mass transfer, Diffusivity, Ion exchange, Leaching, Soil chemical properties.
Identifiers: Exchange isotherms, Chemical potential gradients, Concentration gradients.

Theories of the conductivity of heterogeneous materials may be used to derive concentration dependent differential diffusion coefficients of ions in soils and clays in terms of their mobility on the solid and in the liquid. In practice, for K, Na, H, Sr and phsophate, only a small error is made by assuming that these ions are mobile in the solution. The diffusion coefficients then depend mainly on the slope of the exchange isotherm and on the soil moisture content, which controls the impedance factor. In evaluating the slope of the exchange isotherm, the exchanging ion, the total solution concentration, and the possibility of indefinite equilibration must be considered. Impedance factors for gas diffusion and ion diffusion are fairly similar. It should prove easier to obtain differential diffusion coefficients from the slopes of isotherms and the moisture content than to measure them directly.
W69-06990

THE IMPORTANCE OF MASS FLOW IN THE UPTAKE OF IONS BY ROOTS FROM SOIL,
Oxford Univ. (England). Dept. of Biomathematics; and Oxford Univ. (England). Dept. of Agriculture.
For primary bibliographic entry see Field 02I.
W69-06991

NUTRIENT TRANSPORT TO PLANT ROOTS,
Wisconsin Univ., Madison, Dept. of Soils.
For primary bibliographic entry see Field 02I.
W69-06992

LYSIMETRIC OBSERVATIONS ON THE LEACHING OF ELEMENTS IN PODZOLIC SOILS,
Dokuchayev Central Soil Museum, Leningrad (USSR).
V. V. Ponomareva, T. A. Rozhnova, and N. S. Sotnikova.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 155-164, 1968. 10 p, 1 fig, 3 tab, 6 ref.

Descriptors: *Leaching, *Podzols, *Lysimeters, Water quality, Water chemistry, Humid climates, Forests, Forest soils, Trees, Infiltration, Solutes, Sorption, Ion exchange.
Identifiers: Forest floor.

The composition of lysimeter water from different genetic horizons of a sandy illuvial humus polzol and a soddy podzolic loamy soil, both from the Leningrad region, was studied. The amounts of some nutrient elements leaching from the litter of the podzol were negligible, being of the same order as the amounts entering the soil from the atmosphere. The leaching of the same elements from the litter of the soddy podzolic soil was greater. The predominant amounts of the elements leached were retained by the A-1 horizon. This phenomenon may be related both to the formation of the A-1 horizon under the A-0 horizon and the A-2 horizon under the A-1 horizon in the soddy podzolic soil profiles. Almost all elements entering the A-1 horizons of the soddy podzolic soil were retained there, varying from 20 to 80% retention. Most elements were leached from the A-2 horizon in greater amounts than that of their entry from the A-1 horizon; this was evidence of the current podolizing process. The transitional A-2 B horizon should be regarded as the horizon of most active podzolization due to the high amount of silicate mineral elements being leached from it. Desilication, together with iron and aluminum retention, were characteristics of the B Horizon of the soddy podzolic soil. On the other hand the sandy podzol was characterized by different features of element migration and accumulation from solution.
W69-06993

HYDROLOGICAL PROFILE OF THE SOIL,
AKADEMIYA Nauk SSSR, Moscow. Pochvennyi Institut.
A. A. Rode.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 165-172, 1968. 8 p, 4 fig, 1 tab, 4 ref.

Descriptors: *Soil moisture, *Soil water movement, *Soil-water-plant relationships, Infiltration, Drying, Percolation, Moisture availability, Moisture tension, Drainage, Water table, Zone of aeration, Root zone.
Identifiers: Soil water horizons, Soil hydrological horizons.

Soil water is not evenly distributed, but occurs in distinguishable horizons. Soil water mobility is distinctly different in each horizon, and it may be described by 4 water-content parameters: (1) total capacity; (2) minimum retention capacity; (3) capillary bond rupture content; and (4) wilting point content. A soil hydrological horizon is defined as a zone with a definite mobility, based on these 4 parameters. The 7 horizons described are: total capacity (1); capillary saturation (between 1 and 2); minimal saturation (2); weak desiccation (between 2 and 3); intensive desiccation (between 3 and 4); total biological desiccation (4); and physical desiccation (less than 4). Soil moisture profiles of solonchak-solonetz, southern chernozem, and derno-podzolic soils are used as illustrations. Wetting and drying do not proceed uniformly with depth and time, but hydrological horizons fill with water or dry one at a time. (Knapp-USGS)
W69-06994

BINGHAM FLOW IN CAPILLARY-POROUS MEDIA,
Agrofizicheskii Nauchno-Issledovateiskii Institut, Leningrad (USSR).
N. P. Bondarenko.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 205-212, 1968. 8 p, 2 fig, 2 tab, 7 ref.

Descriptors: *Soil water movement, *Rheology, *Plasticity, *Hydrogen bonding, *Capillary action, Darcy's law, Porous media, Water properties, Water structure.
Identifiers: Non-Newtonian flow, Hydrogen-bonded liquids, Buckingham-Reiner equation, Bingham flow.

Cappillary-flow experiments run at low pressure gradients in quartz and glass tubes show that the flow velocity of some pure hydrogen-bonded liquids such as water, alcohol, etc., is not proportional to the gradient. Such liquids are strictly non-Newtonian, with plastic viscosities of the order of 0.01 to 0.001 dynes/sq cm. Capillary flow of these liquids may be described by the Buckingham-Reiner equation. The flow of liquids without hydrogen bonds is Newtonian. For hydrogen-bonded liquids, Darcy's law is not generally valid. (Knapp-USGS)
W69-06995

SOLUTE AND SOLVENT FLOW AS INFLUENCED AND COUPLED BY SURFACE REACTIONS,
Colorado State Univ., Fort Collins; Agricultural Research Service, Washington, D. C.; and California Univ., Riverside.
W. D. Kemper and J. Letey.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 233-241, 1968. 9 p, 1 fig, 10 ref, 1 append.

Descriptors: *Soil water movement, *Aqueous solutions, *Porous media, *Sorption, Clays, Ion exchange, Ion transport, Osmosis, Electrolytes, Solutes, Salts, Thermodynamics, Mathematical models, Hydraulic conductivity, Filtration.
Identifiers: Surface chemistry.

The influence of surface-reactions on the flow of solutions through porous media is analyzed mathematically. Temperature gradients caused by viscous dissipation of energy are not large enough to invalidate the approximation of isothermal flow in the analysis. The Onsager reciprocal relationship holds approximately. Soil-solute interactions are determined by adsorption and hydrodynamic factors and not by geometrical factors. (Knapp-USGS)
W69-06996

THE SIMULTANEOUS FLOW OF WATER AND HEAT OR SOLUTES THROUGH SOIL,
Utah State Univ., Logan. Dept. of Soils and Meteorology.
A. Hadas, and S. A. Taylor.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 243-251, 1968. 9 p, 1 fig, 2 tab, 18 ref, 1 append.

Descriptors: *Ion transport, *Soil water movement, *Mathematical models, Thermodynamics, Mass transfer, Heat flow, Aqueous solutions, Energy transfer, Equilibrium, Heat transfer.
Identifiers: Irreversible thermodynamics.

A mathematical model uses nonlinear equations to describe the simultaneous flow of water, heat, and solutes through soil, in response to thermal, pressure, and chemical gradients. Solutions obtained with the model were compared with experimental data and were found not to explain real behavior. The discrepancies may be in the assumptions of transport mechanisms or in the validity of the irreversible thermodynamic processes used in the model. The amount of disequilibrium of the real system that may be represented in the mathematical model also has an unknown effect. Despite these problems, the thermodynamic approach appears to be a promising field for further work. (Knapp-USGS)
W69-06997

NON-LINEAR THERMODYNAMICS OF IRREVERSIBLE PROCESSES APPLIED TO SOIL-WATER SYSTEMS,
Punjab Agricultural Univ., Hissar, (India).
R. C. Srivastava, and I. P. Abrol.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 253-262, 1968. 10 p, 21 ref.

Descriptors: *Soil water movement, *Ion transport, *Heat flow, Mathematical models, Thermodynamics, Mass transfer, Aqueous solutions, Energy transfer, Equilibrium.
Identifiers: Irreversible thermodynamics.

An attempt was made to arrive at a generalized theory of transport processes in soil systems by taking into account the non-linear phenomenological relations and also the higher order symmetry relations in addition to Onsager's reciprocal relations. Interrelated rate equations for the transport of matter and energy through soil systems in the non-linear region were obtained. Methods for evaluating the additional phenomenological coefficients occurring in the non-linear rate equations are outlined in principle so that these non-linear phenomenological equations may have a predictive value. Generalized equation for the flow of water through soils which reduces to Darcy's law in the linear region has been shown to be a consequence of such a treatment. The generalized flow equation thus obtained is in agreement with the empirical finding of earlier workers. An attempt was made to work out the transport of water through soils under the influence of temperature gradients. Generalized rate equations for thermally driven water through soils were obtained, and reduce to those derived by Cary and Taylor in the linear region.
W69-06998

A STUDY OF WATER MOVEMENT TOWARDS THE DRYING ZONE DEPENDING ON SOIL CONDITIONS,
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
N. A. Sokolovskays, I. B. Revut, and S. V. Nerpin.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 263-271, 1968. 9 p, 3 fig, 1 tab, 8 ref.

Descriptors: *Soil water movement, *Drying, *Soil-water-plant relationships, Permeameters, Hydraulic models, Moisture stress, Capillary action, Root zone, Soil moisture, Soil physical properties, Soil structure.
Identifiers: Water tension.

Infiltration apparatus was constructed to study water movement in soil samples of different particle size, structural composition and density. It allows measurement of soil water tension while water moves to a drying zone created with a filter through which the necessary suction is maintained. This apparatus has been used for studying water movement in structured soils. Tension isopleths of soil water were obtained for undispersed samples of a well structured deep clay-loam chernozem, and for fractions of different size. These allowed consideration of the process of water movement to the consumption zone in a structured soil. It is established that with soil water reduction below field capacity, regular water movement to the consumption zone is observed in pores of 60-15 micron. When water moves in smaller pores, gradual capillary bond rupture occurs first in larger pores and then in smaller ones. Water bonds between soil aggregates in a deep clay-loam chernozem remain up to pF of 2.6. Capillary bond rupture in pores of 7-5 micron results in the breaking of water bonds between aggregates. Moisture content at capillary bond rupture (MCR) in the soil considered was 32% of dry weight.
W69-06999

FACTORS DETERMINING THE HYDRAULIC CONDUCTIVITY OF RED MEDITERRANEAN SOILS AND DERIVED TYPES,
Water Planning for Israel Ltd., Tel-Aviv.
J. E. Berend, and S. Kary.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 273-282, 1968. 10 p, 1 fig, 2 tab, 9 ref.

Descriptors: *Soil water movement, *Hydraulic conductivity, *Soil types, *Infiltration, Irrigation, Water spreading, Leaching, Soil physical properties, Soil chemical properties, Clays, Artificial recharge, Drying, Water reuse.
Identifiers: *Israel, *Red Mediterranean soils, Pseudogley, Hamra soils, Soil reclamation.

The hydraulic characteristics of Red Mediterranean ('Hamra') soils, and the pseudogley ('Nazzaz') soils derived from them were investigated, using test infiltration ponds up to 1 ha area. Two typical situations were encountered, namely the normal soil profile and a soil profile which had been covered by dune sand. The red soils are invariably very permeable. The pseudogleys are much less pervious. The exchange complex is dominated by Ca and Mg carbonates, which are completely leached only from exposed soils. Leaching water tended to dissolve alkaline-earth carbonates from the uppermost layer of the soil profile which became clogged after the exhaustion of the carbonate reserves. The accelerated illuviation leading to pseudogley formation does not occur under dunes, which prevent extreme drying and cracking. Therefore, the deterioration into pseudogley is assumed to pre-date the dune invasion. Some increase in permeability of the underlying soil occurred with leaching of alkaline-earth carbonates from the invading dunes. This process, probably lasting for hundreds of years, improved the structure of the underlying soil and increased the hydraulic conductivity up to 100-fold. The findings indicate that the correct management of water-spreading grounds involves replenishing the carbonate content and avoiding accelerated illuviation in soils not covered with sand dunes. Liming should be an essential step in the reclamation of the pseudogley described here.
W69-07000

SALT ACCUMULATION PROCESSES IN THE HUNGARIAN DANUBE VALLEY,
Magyar Tudomanyos Akademia Talajtani es Agrokemiai Kutato Intezete, Budapest.
For primary bibliographic entry see Field 03C.
W69-07002

HYDRAULIC CONDUCTIVITY OF SOME TROPICAL SOILS AS A GUIDE TO IRRIGATION WATER QUALITY,
Hawaii Univ., Honolulu. Coll. of Tropical Agriculture; Hawaii Inst. of Geophysics, Honolulu; and Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.

For primary bibliographic entry see Field 03C.
W69-07003

QUALITY OF IRRIGATION WATER,
Indian Council of Agricultural Research, New Delhi; and Punjab Agriculture Univ., Hissar (India).
For primary bibliographic entry see Field 03C.
W69-07004

SOIL AND SALINITY FACTORS IN IRRIGATION AND DRAINAGE OF MALLEE LANDS,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia).
F. Penman.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 415-423, 1968. 9 p, 3 tab, 24 ref.

Descriptors: *Irrigation water, *Water quality, *Salinity, *Drainage, *Saline soils, Leaching, Soil chemical properties, Soil physical properties, Permeability, Hydraulic conductivity, Soil types, Soil structure, Clays, Sands, Infiltration, Waterlogging.
Identifiers: *Australia, Mallee Soils (NSW), Sodium hazard.

With dune and swale topography and catenal sequences from very light soils on ridges to heavy soils on flats, Australian Mallee soils under irrigation are specially subject to problems of water logging and salinity. Minor problems associated with the saline-sodic soils are depressed availability of zinc and iron to plants and the presence of potentially toxic concentrations of water-soluble boron. Artificial under-drainage, mostly by agricultural tile, has alleviated the major problems of excess soil water and toxic salinity and also that of boron toxicity. Removal of water-soluble boron by leaching these soils is however a slow process. Zinc deficiency in such crops as citrus and vines is controlled by application of zinc compounds to the plants. High-alkalinity chlorosis due to iron deficiency is best controlled by application to the soil of a particular type of chelated iron. There is still much scope for improvement in irrigation practice to minimize overloading of drainage systems. Necessary steps include separate handling of light land, preferably by sprinkler irrigation of length of irrigation run and use of larger flows is indicated. Especially for the first 2 irrigations in the spring, running of watering furrows directly above drainage trenches should be avoided.
W69-07006

THE ABSENCE OF THRESHOLD GRADIENTS IN CLAY-WATER SYSTEMS,
Illinois Univ., Urbana. Dept. of Agronomy.
Raymond J. Miller, Allen R. Overman, and John H. Peverly.
Soil Sci Soc Amer Proc, Vol 33, No 2, pp 183-187, Mar-Apr 1969. 5 p, 6 fig, 20 ref.

Descriptors: *Flow, *Porous media, *Clays, Darcys law, Saturated flow, Unsteady flow, Hydraulic properties, Permeability.
Identifiers: Threshold flow gradients.

A transient-pressure transducer and recorder were used to test clay-water systems for threshold gradients in nonlinear transient-saturated flow. In samples of 9, 30, 40, and 50 weight percent montmorillonite and kaolinite, no threshold gradients were measured with initial heads of 12.5-93 cm of water. (Knapp-USGS)
W69-07088

RELATION OF WATER APPLICATION TO EVAPORATION AND STORAGE OF SOIL WATER,
Agricultural Research Service, Fort Collins, Colo. Soil and Water Conservation Research Div.; and Agricultural Research Service, Riverside, Calif. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2D.
W69-07089

DESIGN AND PERFORMANCE OF AN OSMOTIC TENSIOMETER FOR MEASURING CAPILLARY POTENTIAL,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
For primary bibliographic entry see Field 07B.
W69-07090

INTERDEPENDENCE OF WATER DROP ENERGY AND CLOD SIZE ON INFILTRATION AND CLOD STABILITY,
Agricultural Research Service, Iowa City, Iowa; Iowa Agricultural and Home Economics Experiment Station, Ames; and Colorado Agricultural Experiment Station, Fort Collins.
W. D. Moldenhauer, and W. D. Kemper.
Soil Sci Soc Amer Proc, Vol 33, No 2, pp 297-301, Mar-Apr 1969. 5 p, 8 fig, 3 tab, 17 ref.

Descriptors: *Infiltration, *Impact (Rainfall), Pudding, *Soil structure, Soil strength, Soil surfaces, Soil texture, Runoff, Erosion, Permeability.
Identifiers: Raindrop energy, Clod stability.

The decline of intake rates with successive increments of applied water drop energy in various sizes of soil fragments of 2 Iowa and 2 Colorado soil types was studied. There was a wide spread between intake rate of the 8- to 20-mm size range and those of all other sizes after the first increment (1.25 cm as 5-mm drops) was applied. The intake rate of the 8- to 20mm size declined rapidly after the first or second increment. Final intake rates were not correlated with aggregate stability. There was a negative correlation between clay content and final intake rates. Final intake rates after disintegration of large soil fragments in many cases were lower than when initial size ranges were small.
W69-07091

HEXADECANOL IN SOIL- ITS LOCATIONAL STABILITY AND INFLUENCE ON MODULUS OF RUPTURE,
Arizona Agricultural Experiment Station, Tucson; and Arizona Univ., Tucson. Dept. of Agricultural Chemistry and Soils.
Matts A. Myhrman, and D. D. Evans.
Soil Sci Soc Amer Proc, Vol 33, No 2, pp 203-205, Mar- Apr 1969. 3 p, 2 tab, 9 ref.

Descriptors: *Soil structure, *Soil amendments, *Hexadecanol, *Soil water movement, Soil aggregates, Soil texture, Soil treatment, Soil chemical properties, Soil physical properties, Permeability, Soil management, Soil strength.
Identifiers: Hexadecanol in soil.

Modulus of rupture was reduced 65% for a sandy loam soil and 57% for a silt loam soil by addition of 0.4% (by weight) dry powdered hexadecanol. Emulsified hexadecanol, powdered commercial tallow alcohol, and smaller dosages had less effect. Less than 2% of the C-14 tagged hexadecanol placed in a 1-cm thick layer of sandy soil moved under either saturated or unsaturated flow conditions. Movement probably took place in the form of small buoyant particles.
W69-07092

SOME ASPECTS OF TWO-DIMENSIONAL INFILTRATION,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Research and Regional Survey.
A. J. Peck, and T. Talsma.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 11-12, 1968. 11 p, 2 fig, 3 tab, 12 ref.

Descriptors: *Soil water movement, *Infiltration, *Diffusion, Irrigation, Unsaturated flow, Capillary action, Percolation, Unsteady flow, Soil physical properties, Mathematical studies, Furrow irrigation.
Identifiers: Gravity effects (Infiltration).

Experiments on infiltration from a horizontal semicylindrical furrow into several soils and other porous media have provided data to test recently proposed approximate solutions for the cumulative infiltration. Within the limits of possible experimental errors, the theories appear to be adequate, but in the case where two are applicable it is not possible to say which is the better. The effects of gravity are less important in furrow than in one-dimensional infiltration because of the concentrated flux of water in soil close to the furrow. After an initial period, and before gravity is important, the infiltration rate from a furrow is nearly, but never quite, constant. Gravity effects further reduce changes of infiltration rate. In a comparison of media with very different pore size-distributions, gravity effects on cumulative infiltration were greater in the less permeable material. This behaviour is not expected of scaled media with similar pore-size distributions.
W69-07133

APPLICATION OF NON-LINEAR EQUATION OF UNSTEADY WATER FLOW IN SOILS,
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
S. W. Nerpin, G. I. Jusefowitsch, and W. A. Jangarber.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 23-28, 1968. 6 p, 1 fig, 1 tab, 6 ref.

Descriptors: *Soil water movement, *Unsteady flow, *Unsaturated flow, *Mathematical models, Computer programs, Percolation, Irrigation, Infiltration.
Identifiers: Finite-difference methods.

A non-linear equation is presented for a description of water flow in soils in the non-steady state and some theoretical questions are discussed concerning the problems of boundary values of such an equation. The uniqueness of the soltuion of the first problem of boundary values is proved. A family of finite-difference equations for the numerical solution of the problem with boundary values has been established. Using a digital computer, the influence of the coefficient A on the solution of the above mentioned problem has been investigated. If A is a stepwise function of the depth x, then the calculated moisture profiles agree reasonable with the experimental data.
W69-07134

EVAPORATION FROM BARE SOIL UNDER HIGH RADIATION CONDITIONS,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Research and Regional Survey.
For primary bibliographic entry see Field 02D.
W69-07135

CONSUMPTION OF WATER BY PLANTS DEPENDING ON THE NEGATIVE PRESSURE OF THE SOIL WATER,
Akademiya Nauk SSSR. Laboratoriya Lesovedeniya.
For primary bibliographic entry see Field 02I.
W69-07136

LEACHING OF FERTILIZER IONS IN SOIL COLUMNS,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nutrition.
For primary bibliographic entry see Field 05B.
W69-07137

TRANSPORT OF ATRAZINE IN A LATOSOLIC SOIL IN RELATION TO ADSORPTION, DEGRADATION, AND SOIL WATER VARIABLES,
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
For primary bibliographic entry see Field 05B.
W69-07139

SOME EFFECTS OF DRAG ON THE STRUCTURE AND HYDRAULIC CONDUCTIVITY OF SOIL,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Soils.
T. J. Marshall.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 213-221, 1968. 9 p, 2 fig, 2 tab, 11 ref.

Descriptors: *Soil water movement, *Soil structures, *Hydraulic conductivity, Hydraulic models, Permeameters, Cohesive soils, Hydraulics, Fluid mechanics, Pores, Porous media.
Identifiers: Hydraulic drag.

When water flows through a bed of unstable material, the hydraulic conductivity can be affected by detachment of particles or by a change in volume of the material. These two consequences of drag are related respectively to hydraulic gradient at any given position in the bed and to the loss in head between the surface of the bed and that position. The bulk density of 2 columns of artificially packed soil increased and the hydraulic conductivity decreased with increasing head of water during downward flow. Within the columns, bulk density decreased and conductivity increased with height. The effective stress arising from drag and overburden of particles is discussed in relation to laboratory measurements of conductivity when these have to be made on easily deformable material. Although conductivity of the columns was greatly reduced after each increase of head, it otherwise changed little with time. This is ascribed to the measures taken to control detachment and the other possible causes of changing conductivity.
W69-07140

WATER CONSERVATION IN THE SUBHUMID, NORTH LATITUDE PART OF THE CORN BELT OF UNITED STATES,
Agricultural Research Service, Morris, Minn. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 03F.
W69-07141

THE EFFECT OF GYPSUM ON THE WATER STORAGE IN A SANDY LOAM SOIL UNDER AN IRRIGATED PERENNIAL PASTURE,
Commonwealth Scientific and Industrial Research Organization, Riverina (Australia). Riverina Lab.
For primary bibliographic entry see Field 03F.
W69-07142

THE ACHIEVEMENTS OF DRAINAGE THEORY IN RELATION TO PRACTICAL NEEDS: TAKING STOCK,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
E. C. Childs.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 349-356, 1968. 8 p, 23 ref.

Descriptors: *Drainage, *Subsurface drainage, *Drainage systems, *Soil water movement, Hydraulic conductivity, Dupuit-Forchheimer theory, Groundwater movement, Steady flow, Unsteady flow, Saturated flow, Unsaturated flow, Digital computers, Mathematical models.
Identifiers: Drainage theory (Review).

During the last 30 years drainage theory has developed more rapidly than its application, and until this lack of balance is corrected further advances must be somewhat academic. Application needs advances in the estimation of soil parameters and interpretation of agricultural need in terms of physical requirements. But even now an understanding of theory helps the consultant to make broad conclusions about large scale land reclamation projects. For example, in the project at Lake Mariyut in Northern Egypt, it has been possible to forecast a steady water table under irrigation in spite of seasonal fluctuations of intensity of application, and limits between which that water table will eventually lie. Furthermore it has been possible to suggest a program of water-table observations during the early years of undrained irrigation which will give information as to the depth of any impermeable layer which may be present, and thus to assess where, between the estimated limits, the water table lie.
W69-07143

MELIORATIVE EFFECT OF DIRECT ELECTRIC CURRENT ON LEACHING SOLONCHAKOUS SOLONETZ,
Moscow State Univ. (USSR). Faculty of Biology and Soil.
A. F. Vadyunina.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 455-463, 1968. 9 p, 2 fig, 3 tab, 9 ref.

Descriptors: *Saline soils, *Leaching, *Electro-osmosis, *Subsurface drainage, Chlorides, Irrigation, Drainage, Land reclamation, Salinity, Salts, Sulfates, Sodium compounds.
Identifiers: *USSR, Solonchak, Solonetz.

The meliorative effect of a direct electrical current on alkaline and saline soils by increasing the efficiency of leaching has been described. The electric current accelerates leaching of salts from the soil due to a directed movement of the ions (electrolysis) and the soil solution (electro-osmosis) to the cathode, the drain. Rate of salt removal at a current of 1 mA/sq cm is twice as low compared to desalinization at a current of 2 mA/ sq cm. The electric current, depending on its density, reduces 15 times the time of solonetz-solonchaks leaching; in the case of permeable soils such as solonchak the efficiency of the current is considerably lower. On the other hand, efficiency of the water used at lower current density is higher owing to slower movement of water and its prolonged action on the soil. Simultaneously with desalinization, desolonetzization also takes place which in the course of usual leachings results in much larger water and time requirements especially in soda-salinized solonetzic soils. In the case of leaching of solonchaks with water combined with electric current no solonetzization takes place, usually observed when leaching with water alone. The current influence substantially improves the physical properties of soils; the content of fine particles is reduced, and that of water stable micro- and macro-aggregates increased and the water conductivity of soil also increased thus facilitating leaching of impermeable soils. Meliorative effect of the current is almost proportional to the quantity of the electricity passed through the soil.
W69-07145

THE SALTING FACTORS OF IRRIGATED SOILS IN THE TURAN PLAIN,
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Pochvovedeniya.
For primary bibliographic entry see Field 03C.
W69-07146

WATER REPELLENT SANDS,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Soils.
R. D. Bond.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 339-347, 1968. 9 p, 4 fig, 11 ref.

Descriptors: *Impervious soils, *Sands, *Organic matter, Oil, Humus, Humic acids, Infiltration, Crop production, Crop response, Infiltrometers.
Identifiers: *Australia, *Impervious sands.

Many sandy soils in Australia are not wetted readily by water. Rainwater penetrates into such soils through narrow columns leaving the intervening soil quite dry. Where the intensity of repellence is high, these dry patches, devoid of plant growth, may persist through the wet winter period. The water repellence is caused by organic coatings which prevent the water films from spreading over the sand as the advancing contact angle of wetting with water is frequently greater than 90 deg. The effect of these water repellent coatings on penetration of water into soil is discussed and shown to be the factor limiting infiltration rates into repellent sands. Field observations and tests have shown that the degree of repellence varies with the type of plant cover and age of pasture.
W69-07148

WATER CAPTURE IN SOIL SURFACE MICRODEPRESSIONS FOR CROP USE,
Agricultural Research Service, State College, Miss.; and Agricultural Research Service, Watkinsville, Ga. Soil and water Conservation Research Div.
For primary bibliographic entry see Field 03F.
W69-07149

THE ANISOTROPIC NATURE OF LIQUID FLOW IN CLAY-WATER SYSTEMS,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Soils.
A. V. Blackmore.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 223-231, 1968. 9 p, 4 fig, 11 ref.

Descriptors: *Soil water movement, *Clays, *Anisotropy, Bentonite, Kaolinite, Electrical conductance, Hydraulic conductivity.
Identifiers: Formation factor.

Methods are described for obtaining permeability and electrical conductance of clay pastes as a function of their particle orientation relative to the direction of the potential gradient. Measurements are made with montmorillonite and kaolin clays over a wide range of porosity (interparticle spacing) and the effect of free electrolyte is studied. The results show that these transport properties are extremely sensitive to the internal arrangement of the pastes, both properties being several times larger when the material is aligned parallel to the flow direction than in the orthogonal situation. It appears that tortuosity is the dominant factor in this difference. Conductance data, in association with the simple geometry in the case of orientation parallel to the gradient, may be used to estimate hydrodynamic tortuosity in some circumstances.
W69-07151

DYNAMIC MEASUREMENT OF THE HYDROLOGIC CHARACTERISTICS OF UNSATURATED POROUS MATERIALS,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
K. K. Watson.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 283-290, 1968. 8 p, 2 fig, 19 ref.

Descriptors: *Soil water movement, *Hydraulic conductivity, *Infiltration, *Soil moisture meters, *Soil physical properties, Nuclear moisture meters, Piezometers, Instrumentation, Permeameters Tensiometers, Drainage, Permeability, Unsaturated flow, Hydraulic conductivity, Porosity.
Identifiers: Gamma-attenuation moisture meters.

The increasingly important role of a dynamic approach to the measurement of the hydrologic characteristics of porous materials is discussed and the specification for such measurement outlined. This specification is met satisfactorily by the well known gamma attenuation method for water content measurement and by a tensiometer-pressure transducer assembly for pressure head measurement. Correction procedures for response errors for each system are detailed together with studies on the sensitivity of the tensiometer-pressure transducer assembly. These studies concern the effect on the pressure output of temperature variations and the response behaviour of the unit under conditions of changing pore air pressure. The application of dynamic measurement to the determination

of the hydraulic conductivity-water content relationship is outlined and a system-dependent effect in the pressure head-water content relationship as measured in a stratified column (fine over coarse sequence) is described.
W69-07152

THE EFFECT OF FLUCTUATIONS IN FLUID VELOCITY ON HYDRODYNAMIC DISPERSION,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Soils; and Agricultural Research Service, Ames, Iowa. Soil and Water Conservation Research Div.
D. A. Farrell, and W. E. Larson.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 173-184, 1968. 12 p, 2 fig, 14 ref.

Descriptors: *Dispersion, *Diffusion, *Capillary action, *Soil water movement, Porous media, Heterogeneity, Mass transfer, Suspension.
Identifiers: *Hydrodynamic dispersion, Capillary flow.

The effect of fluctuations in fluid velocity on dispersal in a straight capillary tube is analyzed mathematically. For sinusoidal oscillations in fluid velocity the partial differential equation describing the changing distribution of the dispersing materials is solved by using the method of separation of variables. The use of this mathematical technique reduces the problem to finding the solution of two simultaneous ordinary differential equations. The analysis is then extended to cover changes in the waveform of the oscillations by using the method of superposition. For periodic oscillations in the velocity of the convecting fluid, the effective diffusion coefficient is shown to depend not only on the diffusion Peclet number but also on the waveform and generalized frequency of the oscillations. For random fluctuations that can be characterized by an exponentially decaying autocorrelation coefficient the effective diffusion coefficient is shown to depend on the diffusion Peclet number and the generalized time scale of the velocity function.
W69-07153

2H. Lakes

CULTURAL EUTROPHICATION IS REVERSIBLE,
Wisconsin Univ., Madison. Lab. of Limnology.
For primary bibliographic entry see Field 05G.
W69-06858

THE REMOVAL OF DISSOLVED PHOSPHATE FROM LAKE WATERS BY BOTTOM DEPOSITS,
A. V. Holden.
Verh Internat Verein Limnol, Vol 14, pp 247-251, July 1961. 4 fig, 2 ref.

Descriptors: *Phosphate, *Lakes, *Cycling nutrients, *Sediment-water inferface, Mud-water interface, Phosphorus, Adsorption, Eutrophication, Algae, Macroaquatic plants, Fertilization.

Phosphate fertilizer was added to Scottish lochs and phosphate loss from the water measured. At low levels of phosphate added (45 micrograms/liter) the expotential expression dc/dt= Kc described phosphate decline; at higher levels, the expression was altered to account for phosphate saturation of the sediment. Removal rates were expressed as KD values, micrograms phosphate/centimeter squared, per milligrams phosphate/liter per day. A KD value of 6.5 for Loch Kinardochy as compared with 0.6 for cores overlain by water (30 to 40 cm) and lacking algae or macrophytes, suggested that attached flora largely accounted for phosphate uptake in the loch. In laboratory experiments involving high phosphate uptake (700 micrograms/cm squared), phosphate increase up to 200 milligram phosphate percent occurred in the sediment aerobic zone (upper 20 millimeters); some phosphate penetrated to 80 millimeters, into anaerobic zone. About 6% of phosphate retained in the aerobic zone was decinormal hydrochloric acid extractable. Development of anerobic zones decreased acid-extractable phosphorus, although author does not state whether reoxidation occurred before extraction. Phosphorus gradients from productive, unfertilized lochs, were similar to fertilized lochs incubated 48 months. (Armstrong-Wis)
W69-06859

EUTROPHICATION -- CAUSES AND EFFECTS,
Michigan Univ., Ann Arbor. Dept. of Sanitary and Water Resources Engineering.
For primary bibliographic entry see Field 05C.
W69-07084

FRACTIONATION OF PHOSPHORUS IN LAKE SEDIMENTS: ANALYTICAL EVALUATION,
Connecticut Agricultural Experiment Station, New Haven.
C. R. Frink.
Soil Sci Soc Amer Proc, Vol 33, No 2, pp 326-328, Mar-Apr 1969. 3 p, 9 ref.

Descriptors: *Water chemistry, *Lakes, *Phosphorus compounds, *Analytical techniques, *Evaluation, Oxidation, Colorimetry, Inorganic compounds, Organic compounds, Nutrients, Water analysis.
Identifiers: Phosphorus fractionation.

Methods for the fractionation of P in soils were evaluated in the fractionation of P in lake sediments. Both A1-P and Fe-P may be determined readily and precisely by the Chang and Jackson procedure. Reductant-soluble P was more difficult: modifications of a citrate oxidation procedure utilizing potassium permanganate produced an acceptable method. Large amounts of Fe in the Ca-P extracts caused low results, but this was overcome by limiting the aliquot size. Organic P determined by difference between total and inorganic P was not related to the organic matter content of the sediments. An alternative measure of inorganic P, obtained by summing the inorganic P fractions, yielded values for organic P which were correlated with organic matter.
W69-07093

GERMANIUM IN RECENT SEDIMENTS OF THE BLACK SEA (RUSSIAN),
Akademiya Nauk SSSR. Institut Okeanologii.
For primary bibliographic entry see Field 02J.
W69-07120

LIFE CYCLE AND REPRODUCTION OF EPISCHURA BAICALENSIS SARS (COPEPODA, CALANOIDA) IN LAKE BAIKAL (RUSSIAN),
Akademiya Nauk SSSR. Sibirskoe Otdelenie. Limnologicheskii Institut.
E. L. Afanas'yeva.
Dokl Akad Nauk USSR, Vol 185, No 3, pp 693-696, 1969. 4 p, 1 fig, 3 tab, 18 ref.

Descriptors: *Lakes, *Limnology, *Biological communities, Plankton, Bacteria, Phytoplankton, Biomass, Lake fisheries, Temperature, Summer, Winter, Reproduction.
Identifiers: *USSR, Lake Baikal, Epischura Baicalensis, SARS.

Life cycle and reproduction of Epischura Baicalensis Sars was investigated on the basis of collecting zooplankton in Lake Baikal from depths ranging from the surface to 1,400 m during the 1957-1963 period. There is no foundation for considering Epischura as a separate race. (Gabriel-USGS)
W69-07121

2I. Water in Plants

AVAILABLE AND ACCESSIBLE WATER,
Rothamsted Experimental Station, Harpenden (England).
For primary bibliographic entry see Field 02G.
W69-06984

ON THE WATER BALANCE OF GRASSLAND AND FOREST,
Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Soils.
For primary bibliographic entry see Field 02G.
W69-06985

QUANTITATIVE MODEL OF MOISTURE FLOW IN THE PLANT-SOIL SYSTEM,
Hydrometeorological Service of the USSR (Moscow).
For primary bibliographic entry see Field 02G.
W69-06986

THE SIGNIFICANCE OF THE EXTERNAL WATER POTENTIAL AND OF SALT TRANSPORT TO WATER RELATIONS IN PLANTS,
California Univ., Riverside. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 02G.
W69-06989

THE IMPORTANCE OF MASS FLOW IN THE UPTAKE OF IONS BY ROOTS FROM SOIL,
Oxford Univ. (England). Dept. of Biomathematics; and Oxford Univ. (England). Dept. of Agriculture.
F. H. C. Marriott, and P. H. Nye.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 127-134, 1968. 8 p, 2 fig, 2 tab, 11 ref.

Descriptors: *Soil-water-plant relationships, *Soil water movement, *Nutrients, Mass transfer, Solutes, Diffusion, Dispersion, Root systems, Ion transport.
Identifiers: Nutrient transport, Root growth.

Assessment of the relative contribution of mass flow and diffusion to uptake is a matter of definition, and it is less arbitrary to consider the increase in uptake caused by increase in rate of transpiration. The concentration at the root surface and the flux are estimated in terms of the transpiration rate, diffusion coefficient, root absorbing power, root radius and time, by solving a 2nd order partial differential equation numerically. An approximate simple algebraic expression due to Passiours is correct within 10% if transpiration is larger than root absorbing power, which usually holds. When it is smaller, flux increases linearly with transpiration. With increase in transpiration, the proportionate increase in flux due to mass flow, over the flux when transpiration is zero, is independent of root absorbing power. It increases markedly with decrease in moisture level, because the flux when transpiration is zero is then low. It is not greatly affected by the ion species.
W69-06991

NUTRIENT TRANSPORT TO PLANT ROOTS,
Wisconsin Univ., Madison, Dept. of Soils.
W. R. Gardner.
Trans of 9th Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 135-141, 1968. 7 p, 15 ref.

Descriptors: *Soil-water-plant relationships, *Soil water movement, *Nutrients, Mass transfer, Solutes, Diffusion, Dispersion, Root systems, Ion transport.
Identifiers: Nutrient transport, Root growth.

Transport of nutrients through soil to roots by diffusion, mass flow, and root extension is described mathematically by a partial differential equation. Complete analysis is made of transport in 1 dimension and approximate solutions are given for 2- and 3- dimensional movement. (Knapp-USGS)
W69-06992

TEMPERATURE ACCLIMATION AND OXYGEN CONSUMPTION IN PHYSA HAWNII LEA (GASTROPODA: PULMONATA),
Kansas Univ., Lawrence. Dept. of Zoology.
Janet M. Daniels, and Kenneth B. Armitage.
Hydrobiologia, Vol 33, No 1, pp 1-13, Mar 1969. 13 p, 3 fig, 3 tab, 21 ref.

Descriptors: *Acclimatization, *Temperature, *Gastropods, *Oxygen requirements, *Metabolism, Fresh water, Snails, Ecology, Statistical methods, Summer.
Identifiers: Pulmonata temperature acclimation, Oxygen consumption, Eastern Kansas ditches and parks.

A detailed study of temperature acclimation and oxygen consumption in Physa hawnii Lea (Gastropoda) of the ponds and ditches of Eastern Kansas was made. The study shows that there is no relationship between consumption and size in the size range of 10.9 to 41.6 mg; the mean oxygen consumption of snails acclimated at 5 deg, 10 deg, 20 deg, and 25 deg C increases at successfully higher temperatures and animals acclimated at 20 deg and 25 deg evidence a plateau effect at intermediate temperature ranges; there is a significant temperature effect on oxygen consumption; Q sub 10 is higher at low temperature, where Q sub 10 is a metabolic parameter; and P hawnii achieves some degree of temperature independence by acclimation and by change in activity. (Gabriel-USGS)
W69-07095

AN ECOLOGICAL STUDY OF THE ALGAE OF THE RIVER MOOSI, HYDERABAD (INDIA) WITH SPECIAL REFERENCE TO WATER POLLUTION - 1. PHYSICO-CHEMICAL COMPLEXES,
Osmania Univ., Hyderabad, (India). Dept. of Botany.
For primary bibliographic entry see Field 05B.
W69-07096

CONSUMPTION OF WATER BY PLANTS DEPENDING ON THE NEGATIVE PRESSURE OF THE SOIL WATER,
Akademiya Nauk SSSR. Laboratoriya Lesovedeniya.
N. A. Vznuzdaev.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 109-116, 1968. 8 p, 3 fig, 8 ref.

Descriptors: *Soil-water-plant relationships, *Drying, *Transpiration, *Negative pressure, Wilting, Field capacity, Moisture content, Moisture stress, Soil moisture, Soil moisture movement, Arid lands, Pine trees, Oak trees, Consumptive use.
Identifiers: Negative soil water pressure.

Pot experiments with saplings of pine, oak and elm showed that transpiration rate in the interval of soil water pressure from -0.3 to -2.5 atmospheres (zero pressure gradient) was determined by air temperature and humidity. At a soil water pressure less than -2.5 atmospheres, transpiration decreased sharply and became inversely proportioned to soil water pressure, irrespective of environment. The suction forces of roots and leaves are directly related. Neither moisture characteristics of the two soils used nor the species of the trees appeared to have any appreciable affect on this relationship. Plants died when pressure was less than -44 atmospheres. Water deficiency was clearly revealed in changes in the morphology and anatomy of roots, physiologically active in absorption of water.
W69-07136

2J. Erosion and Sedimentation

INTERSTITIAL BRINES IN PLAYA SEDIMENTS,
Geological Survey, Washington, D. C.; Geological Survey, Carson City, Nev.; and Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02K.
W69-06962

COASTAL DUNE STRUCTURES FROM PARANA (BRAZIL),
Parana Univ., Curitiba (Brazil). Geological Inst.
Joao Jose Bigarella, Rosemarie D. Becker, and Gerusa M. Duarte.
Marine Geol, Vol 7, No 1, pp 5-55, Feb 1969. 51 p, 32 fig, 4 tab, 25 ref.

Descriptors: *Dunes, *Coasts, *Sedimentary structures, Sedimentation, Winds, Movement, Provenance, Beds, Stratification, Sands.
Identifiers: *Brazil, Cross-bedding.

In the coastal plain of Parana, vertical sections, both parallel to and transverse to the average wind direction, were dug and cut through dunes. These were compared with the ones presented by the older sand ridge dunes from the Parana coastal plain. The structures of the sand ridge dunes were compared also with those from other types of dunes described by McKee (1966) from the White Sands National Monument (New Mexico) and from the Libyan Desert. The analysis of cross-bedding indicates many common features between the dunes studied by McKee and those from the Parana coastal plain, including high-angle foresets, 30 deg to 36 deg, the almost horizontal character of many bounding surfaces, thinner and flatter individual sets of cross-stratification near the tops of vertical sections, dominant tabular planar sets, and many sets of simple and trough type of cross-stratification. Especially characteristic of the coastal dunes are the convex-upward foresets, located in the upper part of the dune's brink where high-angle slipface strata occur. They result mostly from slumping. The cross-strata dip resultant vector for the whole dune coincides with the average wind direction. (Knapp-USGS)
W69-06965

NORTHWESTERN AFRICAN CONTINENTAL SHELF SEDIMENTS,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
Robert L. McMaster, and Thomas P. Lachance.
Studies supported by contract with Office of Naval Research. Nonr 396 (08) ONR. Marine Geol, Vol 7, No 1, pp 57-67, Feb 1969. 11 p, 5 fig, 11 ref.

Descriptors: *Sedimentation, *Stratigraphy, *Coastal plains, Continental shelf, Sands, Silts, Clays, Erosion, Provenance, Marine Geology, Sediment transport, Stratification, Carbonates.
Identifiers: *Africa, Sedimentary facies.

An investigation of the gravel, sand, silt, and clay components and carbonate content of the bottom surface sediments on the northwestern African shelf and upper slope reveals that sand, composed of biogenic material, quartz, and glauconite, is the most common sediment type. This sand is primarily of biogenic origin between Ifni and Cape Blanc (21 deg N) and immediately south of Cape Verde (15 deg N) whereas the wide Guinea shelf is covered with low carbonate quartz sand. Glauconite is common on the outer shelf and upper slope. Modern mid-shelf slit facies occur immediately south of the Strait of Gibraltar, on the south side of Cape Ghir (30 deg N), between the Gambia and Geba Rivers, and along the narrow Sierra Leone-Liberian shelf. Generally, illite, kaolinite, and montmorillonite are present in these facies with kaolinite predominant in the tropical areas. Modern mid-shelf facies are found where the shelf is narrow and the sediment supply is ample. Apparently bottom turbulence and current action are not sufficient to keep the outer shelf free of fine sediment accumulation. Where the shelf is wide, modern fine sediments are being deposited in estuaries and on the inner shelf. Also, a calcareous sediment type is found where the shelf has been tectonically stable and the sediment supply inadequate. Finally, carbonate values, less than 50%, OCCUR WHERE A MODERN SHELF FACIES IS BEING DEPOSITED OR WHERE CLASTIC SEDIMENTS WERE DISTRIBUTED DURING Pleistocene low sea levels.
W69-06966

OFFSHORE SEDIMENTS AND VALLEYS OF THE ORANGE RIVER (SOUTH AND SOUTHWEST AFRICA),
Georgia Univ., Sapelo Island. Marine Inst.; Georgia Univ., Athens. Dept. of Geology; Millersville State Coll., Pa.; and Ocean Science and Engineering, Inc., Washington, D. C.
John H. Hoyt, B. L. Oostdam, and David D. Smith.
Marine Geol, Vol 7, No 1, pp 69-84, Feb 1969. 16 p, 9 fig, 1 tab, 20 ref.

Descriptors: *Sedimentation, *Rivers, *Channels, *Deposition (Sediments), Deltas, Erosion, Marine Geology, Sediment yield, Silting, Streams, Clays, Coastal plains, Coasts, Currents (Water), Waves (Water).
Identifiers: *South Africa, Submarine valleys.

Detailed 'sparker' surveys of the inner continental shelf off the Orange River, the major drainage of southern Africa, defined a large sediment lens and 2 buried offshore extensions of the bedrock valley. Intermixed river and shelf sediments form a body that is air-foil shaped in plan with trailing edge down-current (northwest). This body extends seaward 16 mi and laterally about 70 mi, has a maximum thickness 6 mi offshore of more than 200 ft, and a volume of approximately 9 cu mi. The sediment surface slopes 10 ft/mi out to 100 ft depths and then steepens to 30-40 ft/mi to 400 ft below sea level. Most sediments appear to be fine sands, silts and clays of probable Late Pleistocene-Holocene age. At the coastline, 2 submarine valley floors are about 150 and 200 ft below sea level and are cut as much as 150 ft into the bedrock platform. Since the slope of the valley floors (20 ft/mi) is not as steep as that of the bedrock platform (50 ft/mi) the valleys intersect the platform surface at depths of about 250 and 300 ft, suggesting 2 or more emergences to approximately those levels. Absence of a subaerial delta results from intensive wave attack by the obliquely impinging South Atlantic swells, which cause a highly effective longshore sediment transport system.
W69-06967

X-RAY ANALYSES OF CLAY MINERALS IN SOME RECENT FLUVIATILE SEDIMENTS ALONG THE COASTS OF CENTRAL ITALY,
Amsterdam Univ., (Netherlands).
J. Quakernaat.
Amsterdam Univ Physico-Geogr Lab Publication No 12, 1968. 105 p, 67 fig, 10 tab, 90 ref, 4 append.

Descriptors: *Clay minerals, *Sedimentary petrology, *X-Ray spectroscopy, *Sedimentation, Sampling, Potassium, Calcium, Magnesium, Chemical analysis, Cation exchange, Water analysis, River flow, Estuaries.
Identifiers: *Central Italy, *Fluviatile sediments.

Distribution of clay minerals in recent fluviatile sediments in the estuaries of several Italian rivers was investigated by using 73 samples from 52 rivers and utilizing a Guinier-de Wolff X-ray camera and an X-ray diffractometer. The qualitative and quantitative results of the study show that 4 clay mineral provinces can be identified along the coasts of central Italy characterized as follows: (1) rivers carrying 60 to 70% of illite and irregular illite-chlorite interstratification; (2) rivers carrying 20 to 50% of illite and irregular smectite-chlorite interstratification; (3) rivers transporting 20 to 40% of high-charge smectite and small amount of kandite; and (4) the river sediments containing high-charge vermiculate and smectite (30 to 40%), 20 to 40% of illite, and 10% of kandite. (Gabriel-USGS)
W69-07009

MODEL STUDY OF HYDRAULIC PHENOMENA ASSOCIATED WITH RIVER BED EROSION AROUND A BRIDGE PIER (POLISH),
Warsaw Engineering Coll., (Poland).
Andrzej Szuster.
Arch Hydrotech, Vol 15, No 4, Warsaw, pp 571-586, 1968. 16 p, 10 fig, 5 ref.

Descriptors: *Model studies, *River bed, *Erosion, *Piers, Bridge design, Hydraulic models, Runoff, Streamflow, Currents (Water), Floods, River basin development, Velocity, Water level fluctuations, Mathematical studies.
Identifiers: *Poland, River bed erosion.

Hydraulic phenomena taking place around bridge piers were investigated analytically and experimentally by using piers of various forms and dimensions. Experiments were particularly concerned with the identification of water streamflow patterns around the models, the distribution of stream vertical velocities, and water level fluctuations around the pier models. The study shows that a diamond-shaped pier is associated with the minimum amount of river bed erosion. (Gabriel-USGS)
W69-07011

THE TIDAL ORIGIN OF SOME VERTICAL SEDIMENTARY CHANGES IN EPICONTINENTAL SEAS,
National Inst. of Oceanography, Wormley (England).
M. A. Johnson, and R. H. Belderson.
J. Geol, Vol 77, No 3, pp 353-357, May 1969. 5 p, 8 ref.

Descriptors: *Sedimentation, *Stratification, *Tides, *Currents (Water), Erosion, Deposition (Sediments), Channels, Deltas, Sedimentary structures, Sediment transport, Bed load, Bottom sediments, Tidal effects, Sea level.
Identifiers: Tidal Currents, Sea level changes.

Vertical changes in grain size and sedimantary structure of shallow sediment deposits and sedimentary rocks are a function of tidal-current action as well as water depth and distance from shore. Tidal current strength depends upon the tidal regime of the whole sea and upon many local factors, some of which may change more rapidly than water depth. Tidal current changes will also occur with any depth changes, and the sedimentary record will preserve the results of both. It is not safe to ascribe sedimentary changes to depth changes alone. Examples of major changes in tidal current patterns with insignificant depth changes include the opening of Dover straits and the opening of the Irish Sea. Smaller tidal current changes may be caused by rapid delta formation, shoreline retreat, sedimentation in tidal channels, and the effect of engineering structures such as dams and Jetties. (Knapp-USGS)
W69-07087

FRACTIONATION OF PHOSPHORUS IN LAKE SEDIMENTS: ANALYTICAL EVALUATION,
Connecticut Agricultural Experiment Station, New Haven.
For primary bibliographic entry see Field 02H.
W69-07093

GERMANIUM IN RECENT SEDIMENTS OF THE BLACK SEA (RUSSIAN),
Akademiya Nauk SSSR. Institut Okeanologii.
V. S. Sokolov, and M. F. Pilipchuk.
Dokl Akad Nauk USSR, Vol 185, No 3, pp 679-682, 1969. 4 p, 2 fig, 1 tab, 17 ref.

Descriptors: *Tracers, *Metals, *Marine geology, Sediments, Precipitable water, Mud, Carbonates, Organic matter, Geochemistry, Erosion, Sands, Clays, Limestones, Sulfides, Abrasion.
Identifiers: Black Sea germanium-bearing sediments.

Distribution and content of germanium in the recent sediments of the Black Sea was investigated by using a standard colorimetric method. The study shows that germanium is characterized by a relatively poor geochemical mobility during the sedimentation process; however its mobile forms are transported into the Black Sea in a soluble state. The distribution of germanium in the recent sediments of the Black Sea shows that the highest Ge concentrations are observed in the marginal parts of the basin, as a result of considerable amount of clastic material due to the abrasion of coastal rocks. (Gabriel-USGS)
W69-07120

WHERE MOST GRAINS OF VERY COARSE SAND AND FINE GRAVEL ARE DEPOSITED,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
Richard J. Russell.
Sedimentology, Vol 11, No 1-2, pp 31-38, Oct 1968. 8 p, 1 fig, 2 tab, 19 ref. Contract Nos Nonr 35 608, 388 002 and Nonr 1575 (03), 388 002.

Descriptors: *Sedimentation, *Sediments, *Particle size, Erosion, Sediment transport, Flow, Sediment yield, Sedimentology, Sediment discharge.
Identifiers: Particle entrainment.

Although supplied to rivers, grains of about 1-6 mm diameters are notably deficient in fluvial deposits because they are more readily entrained and more rapidly transported than grains of larger or smaller size. Very coarse sand and fine gravel are rarely found in shallow-water sediments for the same reason. Currents, mainly of wave origin, concentrate these grains in beaches, where they are present in more-than-ordinary abundance.
W69-07128

SUSPENDED LOAD IN THE RIO DE LA PLATA DRAINAGE BASIN,
Instituto Nacional de Limnologia, Santo Tome (Argentina); and Scripps Institution of Oceanography, La Jolla, Calif.
P. J. Depetris, and J. J. Griffin.
Sedimentology, Vol 11, No 1-2, pp 53-60, Oct 1968. 8 p, 2 fig, 4 tab, 9 ref.

Descriptors: *Sedimentology, *Provenance, *Erosion, Streamflow, Clays, Silts, Sediment yield, Sediment transport, Mineralogy.
Identifiers: Rio de la Plata (Argentina).

The Rio de la Plata Drainage Basin is the second largest in South America, with more than 75% of its discharge provided by the Parana River and the remainder by the Uruguay River. Erosion rates, and silt- and clay-size mineralogy indicate that most of the basin loads are provided by the mountainous environment-type.
W69-07129

EXPERIMENTAL INVESTIGATION ON THE EROSION-SENSITIVITY OF A SAND-CLAY LAMINATION,
Ministry of Transport and Waterways, The Hague (Netherlands); and Waterloopkundig Laboratorium, Delft (Netherlands).
J. H. J. Terwindt, H. N. C. Breusers, and J. N. Svasek.
Sedimentology, Vol 11, No 1-2, pp 105-114, Oct 1968. 10 p, 5 fig, 3 tab, 15 ref.

Descriptors: *Erosion, *Estuaries, *Sediments, Sands, Silts, Turbulence, Channel erosion, Sedimentology, Shear stress, Resistance, Model studies, Hydraulic models.
Identifiers: Laminated sediments.

Laboratory tests were made of the critical shear stress and bed erosion as a function of time and bed shear stress for a sediment consisting of alternating sand and clay layers 0.1-3 cm thick. This type of deposit occurs quite frequently in estuaries and tidal inlets. The tests were carried out on an original bed deposited in an estuary. The critical shear stress and the degree of erosion in relation to time for the sand-clay lamination were found to agree in order of magnitude with those for clay layers. The resistance to erosion of the sand-clay lamination is therefore comparable with that of clay layers.
W69-07130

SOME EXPERIMENTS ON THE GENESIS OF TURBIDITY CURRENTS,
Koninklijke-Shell Exploratie en Produktie Laboratorium, Rijswijk (The Netherlands).
W. Van der Knaap, and R. Eijpe.
Sedimentology, Vol 11, No 1-2, pp 115-124, Oct 1968. 10 p, 4 fig, 1 tab, 8 ref.

Descriptors: *Model studies, *Turbidity currents, *Sediment transport, Density currents, Provenance, Slopes, Sands, Silts, Clays, Mixing, Stratification, Pore pressure, Hydraulic models, Porosity, Permeability.
Identifiers: Flume studies.

Turbidity currents are thought to be the agency responsible for the transport and deposition of the sediments known as turbidites. The way in which such currents may arise has been studied experimentally in a glass-walled tank. The starting point of the experiments was setting the sediments in motion by raising their pore pressure via a shock or vibration. This was achieved in the experiments by striking the metal bottom of the tank with a mallet. The response of a heap of homogeneous sand to such a shock was merely to change the angle of its slope. If a layer of sand was draped over a core of coarser, homogeneous sand, sliding occurred along the plane of permeability contrast and the less coarse sand was deposited at the toe of the slope. When the layer consisted of kaolin, which has a much lower permeability than sand, sliding again took place, butthe clay subsequently mixed with the water and was moved along the bottom of the tank in the manner attributed to turbidity currents. An attempt is made to set up a scaling rule for experiments of this type and the consequences that such a rule may have in subsequent study are briefly discussed.
W69-07131

FORMATION OF LARGE-SCALE TROUGH CROSS-STRATIFICATION IN A FLUVIAL ENVIRONMENT,
Adelaide Univ. (Australia). Dept. of Geology.
George E. Williams.
J Sediment Petrol, Vol 38, No 1, pp 136-140, Mar 1968. 5 p, 8 fig, 6 ref.

Descriptors: *Sedimentation, *Alluvial channels, *Ripple marks, Sand waves, Sedimentary structures, Currents (Water), Stratification.
Identifiers: Cross-bedding.

Large-scale lunate ripple marks are preserved on the dry, sandy bed of a channel crossing a piedmont plain in South Australia. Longitudinal and transverse sections through the channel bed reveal that the ripple marks have deposited typical large-scale trough cross-stratified cosets.
W69-07132

2K. Chemical Processes

A CHEMICAL INDEX OF SOIL NITROGEN AVAILABILITY,
Iowa State Univ., Ames. Dept. of Agronomy.
For primary bibliographic entry see Field 05B.
W69-06860

NUTRIENT REGENERATION AND PREFORMED NUTRIENTS OFF OREGON,
Kilho Park.
Limnology and Oceanography, Vol 12, No 2, pp 353-357, April 1967. 3 fig, 10 ref.

Descriptors: *Cycling nutrients, *Nutrients, *Oregon, Nitrates, Phosphates, Silicates, Oceanography.
Identifiers: *Chemical oceanography, Preformed nutrients, Nutrient ratios.

Vertical distribution of nitrate, phosphate and silicate off the Oregon coast is presented. Measured nitrate and phosphate are divided into two fractions: (1) nutrients of oxidative origins that have

been regenerated from organic matter, and (2) preformed nutrients that were present as such in the water at the time it sank from the surface. The ratios in the biochemical changes in oxygen:nitrogen:phosphorus are 138:16:1, and phosphorus are 7:1. This preformed nutrient ratio might be used to trace the water to its origin. The report also describes vertical nutrient regeneration off the Oregon coast. (Konrad-Wis)
W69-06862

GEOCHEMISTRY OF SUBSURFACE BRINES.
Kansas Univ., Lawrence. Dept. of Civil Engineering; Kansas State Geological Survey, Lawrence; and Louisiana State Univ., Baton Rouge. School of Geology.

E. E. Angino, and G. K. Billings (Editors). Proc of Symp on Geochem of subsurface brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, Mar 1969. 371 p.

Descriptors: *Geochemistry, *Brines, *Subsurface investigations, *Subsurface flow, Groundwater movement, Water chemistry, Solutes.
Identifiers: Subsurface brines.

A symposium dealing with the subject of geochemistry of subsurface brines was held at the University of Kansas on Mar 25-26, 1968 and was sponsored by State Geological Survey of Kansas, Kansas University, and the Geochemical Society of America. The symposium served 3 purposes; it gives evidence that the chemistry of subsurface brines is still in what could be called 'state of art stage,' collects under one cover for the first time a summary of the many problems facing those working with subsurface brines, and presents a good summary of our knowledge of the chemistry of subsurface brines and the problems relative thereto. (Myers-USGS)
W69-06950

CHARACTERIZATION OF BRINES FOR ECONOMIC ANALYSIS,
Dow Chemical Co., Freeport, Tex.
For primary bibliographic entry see Field 03A.
W69-06951

SUBSURFACE BRINES AND MINERAL EQUILIBRIA,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
James R. Kramer.
Chem Geol, Vol 4, no 1-2, pp 37-50, Mar 1969. 14 p, 8 fig, 6 tab, 15 ref. Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968.

Descriptors: *Water chemistry, *Groundwater, *Brines, *Saline water, *Chemical properties, Equilibrium, Data processing, Digital computers, Statistical methods, Regression analysis, Aquifers, Geochemistry, Aqueous solutions.
Identifiers: *Factor analysis.

About, 2,500 brine chemical analyses were classified according to lithology of their source aquifers. Factor analysis was used to determine possible mineral equilibria. Conclusions from factor analysis are used to calculate ion products which are compared with thermodynamically derived equilibrium values. In most analyses, Cl, sulfate, Na, Ca, Mg, bicarbonate, Sr, and Ba are reported. Most waters are Na -Ca-chloride types saturated in calcium carbonate. Sulfate is an independent variable in most waters but has a weak inverse relationship to bicarbonate, a positive correlation to Mg, and sometimes is weakly inverse to Sr and Ba, suggesting an Sr-Ba-sulfate equilibrium. Ca and Mg show a stronger inverse correlation to bicarbonate in dolomite than in other rocks. Ca shows a stronger correlation with Mg in dolomite than in limestone, suggesting Ba-Sr-carbonate equilibrium. Equilibrium involving K-Mg-H-Si is suggested by data from a smaller population of more complete analyses. For main entry see W69-06950. (Knapp-USGS)
W69-06952

ION ASSOCIATION IN NATURAL BRINES,
Geological Survey, Menlo Park, Calif., and Geological Survey, Washington, D. C.
Alfred H. Truesdell, and Blair F. Jones.
Chem Geol, Vol 4, No 1-2, pp 51-62, Mar 1969. 12 p, 1 fig, 4 tab, 26 ref. Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968.

Descriptors: *Water chemistry, *Ions, *Brines, *Saline water, *Equilibrium, Chemical potential, Chemical reactions, Thermodynamics, Electrical conductance, Aqueous solutions.
Identifiers: *Activity coefficients.

Natural brines, both surface and subsurfaces, are highly associated aqueous solutions. Ion complexes in brines may be ion pairs in which the cation remains fully hydrated and the bond between the ions is essentially electrostatic, or coordination complexes in which one or more of the hydration water molecules are replaced by covalent bonds to the anion. Except f Cl, the major simple ions in natural brines form ion pairs; trace and minor metals in brines form mainly coordination complexes. Limitations of the Debye-Huckel relations and lack of data on definition and stability of all associated species in concentrated solutions tend to produce underestimates of the degree of ion association, except where the brines contain a very high proportion of Cl. Data and calculations on closed basin brines of highly varied composition and electrode measurements of single-ion activities emphasize the role of magnesium complexes. Alkaline sulfo- or chloro-carbonate brines (western Great Basin) carry significant trace metal contents apparently as hydroxides or hydroxy polyions. Neutral high chloride brines (Bonneville Basin) are generally deficient in trace metals. Many brine-mineral equilibria, particularly for high-density brines, may be studied thermodynamically. For main entry see W69-06950. (USGS)
W69-06953

GEOCHEMISTRY OF PORE WATERS FROM SHELL OIL COMPANY DRILL HOLES ON THE CONTINENTAL SLOPE OF THE NORTHERN GULF OF MEXICO,
Geological Survey, Woods Hole, Mass.; and Woods Hole Oceanographic Institution, Mass.
F. T. Manheim, and J. L. Bischoff.
Chem Geol, Vol 4, No 1-2, pp 63-82, Mar 1969. 20 p, 9 fig, 5 tab, 26 ref. Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968.

Descriptors: *Water chemistry, *Groundwater, *Drill holes, *Brines, Salts, Chemical reactions, Equilibrium, Aqueous solutions, Ion transport, Diffusion, Chemical precipitation, Geochemistry, Continental slope, Salinity.
Identifiers: *Pore waters, Salt domes.

Pore waters were analyzed from 6 holes drilled in water depths of 600-3,000 ft, penetrating up to 1,000 ft of Pliocene-Recent clayey sediments. Salt and anhydrite caprock were encountered in one diapiric structure on the continental slope. Samples from holes drilled near diapiric structures showed systematic increases of pore-water salinity with depth, suggestive of salt diffusion from underlying salt plugs. Anomalous concentrations of K and Br indicate that at least 1 plug contains late-stage evaporate minerals. Salinities approaching halite saturation were observed. Samples from holes away from diapiric structures showed little change in pore-water chemistry, except for loss of sulfate and other variations attributable to early-stage diagenetic reactions with enclosing sediments. Thus, increased salt concentrations in even shallow sediments from this part of the Gulf appear to provide an indicator of salt masses at depth. For main entry see W69-06950. (USGS)
W69-06954

ON THE EVOLUTION OF SUBSURFACE BRINES IN ISRAEL,
Hebrew Univ., Jerusalem (Israel). Dept. of Geology.
Y. K. Bentor.
Chem Geol, Vol 4, No 1-2, pp 83-110, Mar 1969. 28 p, 20 fig, 2 tab, 14 ref, 1 append. Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968.

Descriptors: *Water chemistry, *Groundwater, *Brines, Classification, Evaporation, Equilibrium, Geochemistry, Salts, Saline water, Aqueous solutions.
Identifiers: *Israel, Dead Sea Rift Valley.

Subsurface brines occur in Israel at depths of 1,000-3,400 m in Early Cambrian-Early Cretaceous formations. Some are identical in composition and salinity with present-day ocean water, except for higher Ca and lower Mg content, a change attributed to dolomitization. The oilfield waters in Early Cretaceous formations of the coastal plain are still similar to ocean water, but 2 to 3 times more saline; they have lost most of their sulphates and are enriched in Br and I, both derived from organic sources. In brines from Jurassic to Early Cambrian sources, salinities as well as the Ca/Na and Br/I ratios increase progressively with depth while the Na/K, bicarbonate/Cl and Cl/Br ratios decrease. It is assumed that the lowermost Paleozoic brines formed by surface evaporation during Infracambrian to Early Cambrian time and were later modified by differential ultrafilitration. Highly saline brines at the depth in the Rift Valley are chemically similar to the Early Paleozoic brines, but even more differentiated. Some show salinities of around 300,000 ppm, a Na/K-value of 1-2 and extremely high Ca concentrations. These waters are believed to be old Paleozoic brines that have undergone a new cycle of surface concentration in Pleistocene Rift Valley lakes, the precursors of the Dead Sea. (For main entry see W69-06950)
W69-06955

WATER HISTORY OF CRETACEOUS AQUIFERS, EAST TEXAS BASIN,
Albion Coll., Mich.
John W. Parker.
Chem Geol, Vol 4, No 1-2, pp 111-133, Mar 1969. 23 p, 22 fig, 16 ref. Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968.

Descriptors: *Water chemistry, *Groundwater, *Brines, *Saline water, *Texas, *Aquifers, Geochemistry, Thermal water, Aqueous solutions, Saline water intrusion, Saline water systems, Solutes, Ions, Chemical reactions, Connate water, Groundwater basins.
Identifiers: *East Texas Basin, Cretaceous aquifers.

Circumstantial evidence of the history of water in 5 Cretaceous aquifers is supplied by water analyses comparisons and a study of the ratios of the major ions, Ca, Mg, Na, Cl, sulfate and bicarbonate. Water from each aquifer has distinctive characteristics, but there are interconnections, especially near the Mexia-Talco fault zone and at an unconformity that extends across the Sabine uplift. Some piercement salt domes modify formation waters, but most salt domes have little or no noticeable effect. Apparently clay sheaths protect the salt columns from solution. Town water supplies on the north Texas shelf are affected by invasion of hot brine from the Tyler Basin, moving from east to west through the Woodbine Sandstone. Ion ratio comparisons show that waters in the older, more deeply buried aquifers have been modified more (compared with present-day sea water) than that in younger, less deeply buried aquifers. Ion ratio maps show the effect of time and rock compositions upon the relative kind and amount of dissolved solids in the water, due to reactions with minerals and organic material in the rocks. (For main entry see W69-06950.)
W69-06956

GEOCHEMISTRY OF SALINE SUBSURFACE WATER, SALINE COUNTY (MISSOURI),
Missouri Univ., Columbia, Dept. of Geology.
Alden B. Carpenter, and John C. Miller.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. OWRR Proj No B-002-MO. Chem Geol, Vol 4, No 1-2, pp 135-167, Mar 1969. 33 p, 22 fig, 11 tab, 32 ref.

Descriptors: *Water chemistry, *Groundwater, *Brines, *Saline water, *Missouri, Equilibrium, Statistical methods, Aqueous solutions, Saline water systems, Aquifers, Limestones, Dolomites, Geochemistry, Connate water, Solutes, Ions, Clays, Ion Exchange.
Identifiers: *Saline County (Missouri).

Saline subsurface water quality in central Missouri is largely governed by mineralogy. Although the water is supersaturated with respect to quartz, the silica concentration is held constant, apparently by the dissolution of illite. A series of scatter diagrams for the water indicates that potassium and hydrogen ion have a markedly different relationship to variations in salinity than do other group Ia elements. The K /H activity ratio is apparently controlled by the presence of illite or illite plus kaolinite. Calculation of ion activity products indicates that the saline water is approximately saturated with respect to calcite and dolomite. The mean Ca /Mg activity ratio, 1.51, is reasonable for water from dolomite limestones. The variations in the Ca/Na and Mg/Na ratios in the Missouri water samples can be predicted using a model in which the concentration of Na is affected only by the addition or removal of water from the system whereas the concentrations of Ca and Mg are additionally affected by equilibration with calcite and dolomite. The ion activity products for Sr and Ba carbonates suggest saturation and that the Sr/Ba activity ratio is mineralogically controlled. Because the chemistry of the saline water is now controlled to a large extent by its mineralogical environment the compositional characteristics of the water cannot be used to determine the origin of the salinity. (For main entry see W69-06950.)
W69-06957

CHEMISTRY OF SOME ANADARKO BASIN BRINES CONTAINING HIGH CONCENTRATION OF IODIDE,
Bureau of Mines, Bartlesville. Okla. Bartlesville Petroleum Research Center.
A. Gene Collins.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 169-187, Mar 1969. 19 p, 10 fig, 5 tab, 51 ref.

Descriptors: *Water chemistry, *Groundwater, *Brines, *Oklahoma, Groundwater basins, Geochemistry, Chemical reactions, Equilibrium, Aqueous solutions, Saline water, Saline water systems, Aquifers, Connate water, Solutes, Ions, Diagenesis.
Identifiers: *Anadarko Basin (Okla), Iodide concentrations.

A study was made to determine the geochemical relationships between the subsurface fluids and some of the geologic strata in the Anadarko Basin, Oklahoma. Samples of brines, cores, and petroleums from Pennsylvanian and Mississippian age sediments were analyzed. The brine samples from Mississippian and Pennsylvanian age sediments in the northern Oklahoma Platform area contain the highest concentration of iodide ever recorded. The brines, a Na-Ca-Cl type, probably have undergone diageneses such as dolomitization. The Br concentrations of these brines indicate that they probably are relict. Some of the brines were in equilibria with sandstones, some with dolomites, and some with limestones. Compared to sea water concentrated by solar evaporation, most of these brines are enriched in Br, Ca, Li, Sr, and I, and depleted in Mg, and K. Most of the brines from Mississippian age sediments are enriched in B, and most from Pennsylvanian age sediments were depleted in B. The high concentrations of I in these brines is attributed to concentration by shallow water fauna and flora, preserved by rapid sedimentation. Additional concentration of I in these brines occurred during diagenesis. (For main entry see W69-06950.)
W69-06958

MINOR ELEMENTS IN OIL-FIELD WATERS,
Shell Develop Co., Houston, Tex.; Du Pont de Nemours (E. I.) and Co., Wilmington, Del.; and Perkin-Elmer Co, Silver Spring, Md.
Gordon Rittenhous, Robert B. Fulton, III, Robert J. Grabowski, and Joseph L. Bernard.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 189-209, Mar 1969. 21 p, 8 fig, 5 tab, 31 ref.

Descriptors: *Geochemistry, *Groundwater, *Oilfields, *Trace lements, Aqueous solutions, Equilibrium, Chemical reactions, Solutes, Ions, Ion exchange, Saline water, Connate water, Spectroscopy.
Identifiers: *Oil-field waters, Minor elements.

The minor element composition of 823 oil-field water samples from the United States and Canada was determined spectrochemically. In these samples the determined concentrations have a wide range but commonly are K and Sr, over 100 ppm; Al, B, Ba, Fe, Li, and Si, 1.0-100 ppm; Cr, Cu, Mn, Ni, Sn, Ti, and Zr in the ppb range in most waters; and Be, Co, Pb, V, W, and Zn, in the ppb range in some waters. When differences in total dissolved solid contents are eliminated by calculation, Cr, Li, Mn, Si, and Sr are commonly more than twice as abundant as in present sea water; Cu, K, Ni, and Sn are commonly less than half as abundant. Si content appears to vary between areas, between formations in the same area, and inversely with total solids content in the same formation. Relationships in the variation of other minor elements is more difficult to establish, partly because the minor elements, if actually present, were below detection limits and partly because spectrochemical method was not of high precision. Extensive changes in pH of many waters occurred between collection and analysis. Because of this and changes that may occur between subsurfaces and surface, quantitative interpretation of geochemical relationships between water and rock composition will be difficult. (For main entry see W69-06950.)
W69-06959

GEOCHEMISTRY AND ORIGIN OF FORMATION WATERS IN THE WESTERN CANADA SEDIMENTARY BASIN, 2. ALKALI METALS,
Louisiana State Univ., Baton Rouge; Research Council of Alberta, Edmonton; and Alberta Oil and Gas Conservation Board, Edmonton.
Gale K. Billings, Brian Hitchon, and D. R. Brian.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 211-223, Mar 1969. 13 p, 5 fig, 2 tab, 22 ref.

Descriptors: *Geochemistry, *Water chemistry, *Groundwater, *Alkali metals, Groundwater basins, Solutes, Potassium, Sodium, Ion exchange, Membrane processes, Clays, Filtration, Connate water, Chemical reactions.
Identifiers: *Canada, Western Canada sedimentary basin, Lithium, Rubidium.

The population statistics for Cl, Br, I, bicarbonate, sulfate, Na, Ca, Mg, K, Rb, Li, Sr, Mn, Zn, Fe, Ni, Co, Cr and Cu in formation waters from the western Canada sedimentary basin are presented, together with weighted mean composition. Five types of formation waters are present in the basin but only 2 are considered in detail: (1) a membrane-concentrated formation water; and (2) a formation water formed either by mixture of 1 and very small amounts of bitterns resulting from halite precipitation or by hyperfiltration. Investigation of the alkali metals indicates that the membrane is selective and leads to a pattern of relative concentration in the decreasing order: Rb; K; Na; Li. The movement of alkalies through the filter is primarily by sitehopping and the relative rate is controlled by the ion's ease of replacibility in the decreasing order: Li; Na; K; Rb. The composition, and thus ion-ratios, are set by mineral-solution reactions, particularly during early diagenesis. Modification of the composition then occurs by selective filtration, further chemical reaction, and mixing during the subsequent fluid migration resulting from hydrodynamic drive. (For main entry see W69-06950.)
W69-06960

SOME CHEMICAL ALTERATIONS OF SUBSURFACE WATERS DURING DIAGENESIS,
University of Southern California, Los Angeles. Dept. of Petroleum Engineering.
George V. Chilingarian, and Herman H. Rieke.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 235-252, Mar 1969. 18 p, 8 fig, 9 tab, 38 ref.

Descriptors: *Geochemistry, *Diagenesis, *Connate water, *Subsurface waters, Saline water, Brines, Oil fields, Solutes, Sea water, Chemical reactions, Equilibrium, Membrane processes, Ion exchange, Filtration, Compaction, Organic compounds.
Identifiers: *Oil-field brines, Pore waters, Oxygen isotopes.

Pore waters in most of the petroliferous sedimentary basins may ultimately be derived from the sea. There is a striking similarity between the amino-acid spectra in the fossil brines and in present-day sea water. Similarities in solutes also point in this direction, yet systematic chemical differences exist between the ancient and modern connate waters. The changes may be caused by a variety of processes and mechanisms such as dissolution and precipitation, pH-Eh variations, microbial activities, base exchange, chemisorption, and dolomitization. The similarity between isotope characteristics of the oil-field brines and present-day sea water suggests that in many cases concentration has not been accomplished by syngenetic evaporation, but probably occurred as a result of compaction and ion filtration by charged-net clay membranes. Experimental results indicate that the mineralization of squeezed-out solutions progressively decreases with increasing overburden pressure, but in moving vertically through a thick shale sequence, could increase to levels found in oil-field brines; the Ca/Cl and Ca/Na ratios could, but not necessarily, also increase. The mineralization of interstitial solutions in shales should be less than that in associated sandstones. If water moves from a sandstone bed through a clay layer into another sandstone bed, the water in the latter bed may be less mineralized because of filtration through a charged-net clay membrane. (For main entry see W69-06950.)
W69-06961

INTERSTITIAL BRINES IN PLAYA SEDIMENTS,
Geological Survey, Washington, D. C.; Geological Survey, Carson City, Nev.; and Geological Survey, Menlo Park, Calif.
Blair F. Jones, A. S. Vandenburgh, A. H. Truesdell, and S. L. Rettig.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 253-262, Mar 1969. 10 p, 4 fig, 1 tab, 11 ref.

Descriptors: *Water chemistry, *Brines, *Playas, Evaporation, Saline lakes, Saline water, Saline water systems, Chemical precipitation, Equilibrium, Solutes, Aqueous solutions, Lakes, Great Basin, Clays, Groundwater, Ion exchange.
Identifiers: *Playa sediments, Western U.S.

In many closed drainages in the Great Basin, the interstitial solutions of shallow, fine-grained playa deposits store a large quantity of dissolved solids and are often more concentrated than associated lakes and ponds. These interstitial fluids commonly have a distinctive ionic composition which sometimes cannot be explained by either simple mixing of surface and subsurface inflow or by evaporative concentration. At Abert Lake, Oregon, the interstitial solute concentrations increase with depth to values as much as 5 times greater than the lake. Where Na, Cl, and carbonate species constitute more than 90% of the solutes, Na/Cl ratios in the lake water are lower than in the lake bottom sediments and higher than in playa fluids, and Na/K ratios are highest in the fluids of lake bottom muds and lowest in playa fluids. In deeper playa profiles, interstitial Na/Cl tended to decrease with depth (5 ft maximum). Na/Cl ratios are indicative of total carbon dioxide in solution and the effects of organic decay in surficial sediments. These ratios, coupled with data on silica and bulk density, show that higher carbon dioxide content accompanying decay promotes silicate dissolution and hydrogen ion exchange, stripping alkalis from sediment which had preferentially absorbed K when entering the lake. On subsequent loss of pore fluid in the playa regime, silica initially released to solution in the lake environment is readsorbed on dissolution products. For main entry see W69-06950 (USGS)
W69-06962

GEOCHEMISTRY AND HYDRODYNAMICS OF THE PARADOX BASIN REGION, UTAH, COLORADO AND NEW MEXICO,
Geological Survey, Washington, D. C.; and Petroleum Research Corp., Denver, Colo.
Bruce B. Hanshaw, and Gilman A. Hill.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 263-294, Mar 1969. 32 p, 9 fig, 3 tab, 29 ref.

Descriptors: *Water chemistry, *Hydrodynamics, *Saline water systems, *Groundwater basins, *Southwest U.S., Chemical reactions, Equilibrium, Ions, Solutes, Ion exchange, Membrane processes, Osmosis, Filtration, Groundwater movement, Aquifers, Aquicludes, Clays, Shales, Recharge, Potentiometric level.
Identifiers: Paradox Basin (Utah-Colo-N.M.).

The water chemistry and groundwater movement of the Paradox Basin in the 4 corners region of SW United States was studied using drill-stem-test samples and pressure charts. The direction of groundwater movement in all units studied in the Paradox Basin is principally southwestward. Sodium chloride type water predominates in Permian and pre-Permian rocks although Ca and Mg are commonly high in some areas. In places where the groundwater has less than 10,000 mg/l total dissolved solids, sulfate generally becomes important. A combination of chemical and hydrologic data indicates that the east flank of the Monument uplift is faulted at depth. East of the uplift, groundwater from Paleozoic aquifers is generally briny, about 35,000 mg/l whereas west of the uplift, groundwater from these aquifers is commonly fresh to slightly saline, about 10,000 mg/l. This pattern indicates a restriction of flow from west to east in the area of the uplift; the regional flow trend is diverted southward by the fault barrier at depth. Previous hydrologic and geochemical study of the San Juan Basin shows the existence of an osmotic flow system within Cretaceous strata. Jurassic horizons were assumed to be the outflow receptors of the membrane system. However, the known occurrence of briny groundwater in Pennsylvania and Mississippiam aquifers coupled with the high potentio-metric surfaces of these same units leads to the postulate that they, not the Jurassic, may be the outflow receptors for the entire membrane system. For main entry see W69-06950. (USGS)
W69-06963

RELATIVE FACTORS INFLUENCING MEMBRANE FILTRATION EFFECTS IN GEOLOGIC ENVIRONMENTS,
California Univ., Berkeley. Dept. of Geology and Geophysics.
Frederick A. F. Berry.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Grant No GA-1371 (NSF). Chem Geol, Vol 4, No 1-2, pp 295-301, Mar 1969. 7 p, 52 ref.

Descriptors: *Water chemistry, *Membrane processes, *Clays, *Shales, Osmosis, Adsorption, Ion exchange, Connate water, Saline water, Brines, Geochemistry, Filtration.
Identifiers: *Hyperfiltration, Kerogen.

The membrane properties of shales are caused by the electrical charge properties of their constituent clay minerals and organic matter. The clay minerals are cation exchangers at singly-charged sites and have a small anion exchange capacity by replacement of hydroxide ion. Kerogen is the main organic constituent, and may be as much as 2% by weight of shales. It is composed mainly of denatured humic acids which have cation exchange capacity in the carboxyl and hydroxyl groups. Amino acids have anion exchange capacity. Rates of passage of ions through shale membranes are determined by availability of ions, dissociation, non-ionic adsorption, relative adsorption of divalent and monovalent cations, and mass effects. Dissociation effects are probably the most important; the more highly associated species pass most readily. Common clays adsorb divalent cations in preference to monovalent species. Ions are preferentially adsorbed when differences of solute ionic potential and exchange-site ionic potential are minimum; Na should be hyperfiltrated preferentially to Li and Sr with respect to Ca in most clays. Increased temperature and concentration should decrease hyperfiltration. For main entry see W69-06950. (Knapp-USGS)
W69-06964

SOLUTE AND SOLVENT FLOW AS INFLUENCED AND COUPLED BY SURFACE REACTIONS,
Colorado State Univ., Fort Collins; Agricultural Research Service, Washington, D. C.; and California Univ., Riverside.
For primary bibliographic entry see Field 02G.
W69-06996

THE SIMULTANEOUS FLOW OF WATER AND HEAT OR SOLUTES THROUGH SOIL,
Utah State Univ., Logan. Dept. of Soils and Meteorology.
For primary bibliographic entry see Field 02G.
W69-06997

SOIL AND SALINITY FACTORS IN IRRIGATION AND DRAINAGE OF MALLEE LANDS,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia).
For primary bibliographic entry see Field 02G.
W69-07006

SALINE SOIL CLASSIFICATION USING THE 5:1 AQUEOUS EXTRACT,
Centro de Edafologia y Biologia Aplicada del Segura, Murcia, (Spain).
For primary bibliographic entry see Field 03C.
W69-07008

HEXADECANOL IN SOIL- ITS LOCATIONAL STABILITY AND INFLUENCE ON MODULUS OF RUPTURE,
Arizona Agricultural Experiment Station, Tucson; and Arizona Univ., Tucson. Dept. of Agricultural Chemistry and Soils.
For primary bibliographic entry see Field 02G.
W69-07092

FRACTIONATION OF PHOSPHORUS IN LAKE SEDIMENTS: ANALYTICAL EVALUATION,
Connecticut Agricultural Experiment Station, New Haven.
For primary bibliographic entry see Field 02H.
W69-07093

DETERMINATION OF DISSOLVED HYDROCARBONS IN SUBSURFACE BRINES,
Chevron Research Company, La Habra, Calif.
For primary bibliographic entry see Field 05A.
W69-07101

COMPUTER-PRODUCED TABLES, MAPS, AND DIAGRAMS AS TOOLS IN THE INTERPRETATION OF BRINE DATA FROM SOUTHEASTERN KANSAS,
Geological Survey, Washington, D. C.
For primary bibliographic entry see Field 05G.
W69-07102

CHEMICAL COMPOSITION OF SELECTED KANSAS BRINES AS AN AID TO INTERPRETING CHANGE IN WATER CHEMISTRY WITH DEPTH,
Geological Survey, Lawrence, Kans.; Kansas Univ., Lawrence; and Kansas State Geological Survey, Lawrence.
For primary bibliographic entry see Field 05G.
W69-07103

SALINE WATER IN SOUTHEASTERN NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.; and Air Force Weapons Lab., Kirtland AFB, N. Mex.
William L. Hiss, Johannes B. Peterson, and Thomas R. Ramsey.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 341-360, Mar 1969. 20 p, 12 fig, 10 ref.

Descriptors: *Water chemistry, *Brines, *Oil fields, *New Mexico, *Texas, Groundwater movement, Groundwater basins, Groundwater, Aqueous solutions, Saline water systems, Data processing, Data collections, Digital computers, Computer programs, Maps.
Identifiers: *Tabulation, Water quality data, Permian Basin.

Saline waters from formations of several geologic ages are being studied in a 7-county area in southeastern New Mexico and western Texas, including the northern and eastern margins of the Delaware Basin between the Guadalupe and Glass Mountains. Chloride-ion concentrations in water produced from rocks of various ages and depths were mapped in Lea County, New Mexico, using machine map-plotting techniques and trend analyses. Anomalously low chloride concentrations (1,000-3,000 mg/l) were found along the western margin of the Central Basin platform in the San Andres and Capitan Limestone Formations of Permian age. These low chloride-ion concentrations may be due to preferential circulation of groundwater through the more porous and permeable rocks. Data were obtained principally from oil companies and from related service companies. Approximately 20,000 water analyses collected from over 65 sources were coded, recorded on punch cards and stored on magnetic tape for computer operations. Extensive manual and computer error checks for duplication and accuracy were made to eliminate data errors. The original 20,000 analyses considered were reduced to 6,000 representative analyses which are being used in the saline water studies. (USGS)
W69-07104

INCREASING CONCENTRATION OF SUBSURFACE BRINES WITH DEPTH,
Tulsa Univ., Okla.
Parke A. Dickey.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 361-370, Mar 1969. 10 p, 7 fig, 22 ref.

Descriptors: *Water chemistry, *Brines, *Oil fields, *Geochemistry, *Diagenesis, Saline water systems, Aqueous solutions, Connate water, Chemical reactions.
Identifiers: *Oil-producing rocks, Subsurface brines.

The concentration of deep subsurface brines of the chloride-calcium chemical type normally increases with depth. In many areas the increase is linear over thousands of feet vertically. The rate of increase ranges between 15,000 and 100,000 ppm/1,000 ft. In the Gulf Coast this relationship reverses at great depths. Here, however, the presence of abnormal fluid pressures indicates that processes of compaction and diagenesis are not yet complete. Any hypothesis to account for the chemical composition of these brines must explain the linear nature of the increase in concentration with depth.
W69-07105

LEACHING OF FERTILIZER IONS IN SOIL COLUMNS,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nutrition.
For primary bibliographic entry see Field 05B.
W69-07137

TRANSPORT OF ATRAZINE IN A LATOSOLIC SOIL IN RELATION TO ADSORPTION, DEGRADATION, AND SOIL WATER VARIABLES,
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
For primary bibliographic entry see Field 05B.
W69-07139

EVALUATION OF THE QUALITY OF IRRIGATION WATERS WITH HIGH BICARBONATE CONTENT IN RELATION TO THE DRAINAGE CONDITIONS,
Institute de Edafologia, Maracay (Venezuela). Facultad de Agronomia.
For primary bibliographic entry see Field 03C.
W69-07144

2L. Estuaries

DETERMINATION OF NITRATE IN ESTUARINE WATERS--COMPARISON OF A HYDRAZINE REDUCTION AND A BRUCINE PROCEDURE AND MODIFICATION OF A BRUCINE PROCEDURE,
Federal Water Pollution Control Administration, Metuchen, N. J. Hudson-Champlain and Metropotitan Coastal Comprehensive Water Pollution Control Project.
Lloyd Kahn, and Francis T. Brezenski.
Environmental Science and Technology, Vol 1, No 7, pp 488-491, June 1967. 2 fig, 2 tab, 18 ref.

Descriptors: *Chemical analysis, *Estuaries, *Nitrates, Nitrogen compounds, Colorimetry.
Identifiers: *Nitrate determination, *Hydrazine reduction procedure, *Modified brucine procedure, Estuarine waters.

Nitrate levels in estuarine waters were evaluated by hydrazine reduction and a brucine procedure. Low results were often obtained with the hydrazine procedure presumably due to depletion of available hydrazine by environmental components in the system, resulting in incomplete reduction of nitrate. The brucine method of Jenkins and Medsker was modified to provide a better behavior of the Beer-Lambert law. The modification involves carrying out the reduction step in boiling water, rather than at 20 deg C. Evidently the reaction kinetics are such that at the elevated temperature no break in the calibration curve is observed, the procedure resulting in the linearity of from 0 to 0.6 milligrams of nitrate-nitrogen per liter. The precision of the modified-brucine procedure was evaluated to be better than 0.03 milligram of nitrate-nitrogen per liter. (Konrad-Wis)
W69-06861

GEOCHEMISTRY OF PORE WATERS FROM SHELL OIL COMPANY DRILL HOLES ON THE CONTINENTAL SLOPE OF THE NORTHERN GULF OF MEXICO,
Geological Survey, Woods Hole, Mass.; and Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 02K.
W69-06954

COASTAL DUNE STRUCTURES FROM PARANA (BRAZIL),
Parana Univ., Curitiba (Brazil). Geological Inst.
For primary bibliographic entry see Field 02J.
W69-06965

NORTHWESTERN AFRICAN CONTINENTAL SHELF SEDIMENTS,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 02J.
W69-06966

OFFSHORE SEDIMENTS AND VALLEYS OF THE ORANGE RIVER (SOUTH AND SOUTHWEST AFRICA),
Georgia Univ., Sapelo Island. Marine Inst.; Georgia Univ., Athens. Dept. of Geology; Millersville State Coll., Pa.; and Ocean Science and Engineering, Inc., Washington, D. C.
For primary bibliographic entry see Field 02J.
W69-06967

X-RAY ANALYSES OF CLAY MINERALS IN SOME RECENT FLUVIATILE SEDIMENTS ALONG THE COASTS OF CENTRAL ITALY,
Amsterdam Univ., (Netherlands).
For primary bibliographic entry see Field 02J.
W69-07009

EXPERIMENTAL INVESTIGATION ON THE EROSION-SENSITIVITY OF A SAND-CLAY LAMINATION,
Ministry of Transport and Waterways, The Hague (Netherlands); and Waterloopkundig Laboratorium, Delft (Netherlands).
For primary bibliographic entry see Field 02J.
W69-07130

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

CHARACTERIZATION OF BRINES FOR ECONOMIC ANALYSIS,
Dow Chemical Co., Freeport, Tex.
W. F. McIlhenny, P. E. Muehlberg, and H. G. Smith.
Chem Geol, Vol 4, No 1-2, pp 9-35, Mar 1969. 28 p, 7 fig, 7 tab, 14 ref. Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. OSW 15-01-0001-392.

Descriptors: *Brines, *Saline water, *Classification, *Data processing, *Computer programs, Desalination, Chemical analysis, Chemical precipitation, Chemical properties, Salts, Aqueous solutions.
Identifiers: Chemical classification.

To study the utilization of waste brines from desalination, a method of classifying brines by chemical composition using a computer was developed, based on the chemical system in which the brines crystallize and the composition of the solid phases produced by crystallization. The 7-component system of Na, K, Mg, Ca, Cl, sulfate, and bicarbonate is divided into 3 quinary systems, each of which is completely described for computer processing by locating all invariant points, planes, and corner points of the solid phase regions. Descriptions of 1,552 brines useful as input to desalination plants are cataloged, sorted, and classified by a FORTRAN IV program. Flow charts describing the program are included. For main entry see W69-06950. (Knapp-USGS)
W69-06951

3B. Water Yield Improvement

WATER CAPTURE IN SOIL SURFACE MICRODEPRESSIONS FOR CROP USE,
Agricultural Research Service, State College, Miss.; and Agricultural Research Service, Watkinsville, Ga. Soil and water Conservation Research Div.
For primary bibliographic entry see Field 03F.
W69-07149

3C. Use of Water of Impaired Quality

GEOCHEMISTRY OF SUBSURFACE BRINES.
Kansas Univ., Lawrence. Dept. of Civil Engineering; Kansas State Geological Survey, Lawrence; and Louisiana State Univ., Baton Rouge. School of Geology.
For primary bibliographic entry see Field 02K.
W69-06950

SALT ACCUMULATION PROCESSES IN THE HUNGARIAN DANUBE VALLEY,
Magyar Tudomanyos Akademia Talajtani es Agrokemiai Kutato Intezete, Budapest.
Gy. Varallyay.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 371-380, 1968. 10 p, 4 fig, 1 tab, 14 ref.

Descriptors: *Saline soils, *Irrigation, *Alkaline soils, Salt tolerance, Impervious soils, Clays, Ion exchange, Soil structure, Soil chemical properties, Soil types, Saline water, Calcareous soils, Water table, Drainage, Groundwater movement, Evaporation.
Identifiers: *Hungary, *Danube Valley.

Many of the salt-affected soils of Hungary occur in the Danube Valley. Here the main causes of the formation and the low fertility of the solonchak, solonchak-solonetz and calcareous solonchakized solonetz soils are their high sodium bicarbonate and carbonate contents. Part of the rain water falling on the extensive catchment areas of the periphery of the Danube basin infiltrates into the soil and becomes enriched in calcium or sodium bicarbonates, depending upon the source rock material. This water moves towards the deeper parts of the adjacent subsurface drainage basin lined with the Pannonian substratum and then accumulates in the stagnant groundwater basin of the Danube Valley. At places where the static groundwater is within 2 m of the surface, evaporation from the groundwater greatly exceeds infiltration, especially during summer. This produces a concentration of salts in the groundwater. The alkaline-earth bicarbonates precipitate as insoluble carbonates. Only the easily soluble sodium salts remain in solution, migrate and become distributed in the soil profile according to their solubility. Ultimately salt accumulation horizons develop in the interzone of upward and downward water movement.
W69-07002

HYDRAULIC CONDUCTIVITY OF SOME TROPICAL SOILS AS A GUIDE TO IRRIGATION WATER QUALITY,
Hawaii Univ., Honolulu. Coll. of Tropical Agriculture; Hawaii Inst. of Geophysics, Honolulu; and Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
S. A. El-Swaify, and L. D. Swindale.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 381-389, 1968. 9 p, 4 fig, 1 tab, 16 ref.

Descriptors: *Irrigation water, *Saline water, *Soil chemical properties, *Hawaii, *Hydraulic conductivity, Soil physical properties, Permeability, Soil water movement, Drainage, Leaching, Clays, Laterites.
Identifiers: Tropical soils, Latosols.

Relatively high levels of salinity and high proportions of sodium in irrigation waters may be tolerated if the soil allows sufficient downward movement of the large water applications necessary to prevent salt accumulation, and resists detrimental peptization. A tropical Red Earth and an Andosol were tested for these conditions using hydraulic conductivity measurements, employing solutions of sea water composition and homoionic solutions of Mg, Ca, and Na chlorides. Concentration of applied waters ranged from a high of 0.61 N to a low of 0.012 N in homoionic solutions and to 0.006 N for sea water. Subsurface soils maintained very high and essentially unchanged conductivities under all application. Under these conditions (at which many temperate zone soils are practically impermeable), infiltration values of 2.85 and 0.875 cm/hr were obtained for surface Tropical Red Earths and Andosols, respectively. Alternate applications of sea and distilled water caused slight structural changes even though the distilled water removed all soluble salts from highly sodium-saturated soils. It may be possible to increase the permissible limits of salinity and sodium in irrigation water for such soils. This finding has important implications in that these soils are widespread in tropical regions where additional sources of irrigation water are generally needed for effective development.
W69-07003

QUALITY OF IRRIGATION WATER,
Indian Council of Agricultural Research, New Delhi; and Punjab Agriculture Univ., Hissar (India).
J. S. Kanwar, and B. S. Kanwar.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 391-403, 1968. 13 p, 1 fig, 5 tab, 24 ref.

Descriptors: *Irrigation water, *Water quality, *Saline water, *Soil chemical properties, Soil physical properties, Hydraulic conductivity, Permeability, Soil water movement, Drainage, Leaching, Clays, Soil types, Soil structure, Sodium compounds, Bicarbonates, Chlorides.
Identifiers: Salinity hazard, Sodium absorption ratio.

The effects of irrigation water containing 7.5, 22.5, 50.0 and 100 m-equiv/l of salt and sodium adsorption ratios of 4,8,16, and 26 on soil and crops were studied, applying 90 acre-inches of water to 2 crops of maize and 1 of wheat grown in succession. In a second experiment the effects of various levels of residual sodium carbonate (0.1, 1.25, 2.50 and 5.0 m-equiv/1) on the soil and crops were studied. It was observed that the yields of all crops decreased as the salt concentration of water increased. The germination of the 2nd crop of maize and 3rd crop, wheat, could not occur under the treatment of 200 m-equiv/1 of salts. A reduction in yield of 50% in the 2nd crop of maize occurred with a treatment of 50 m-equiv/1 of salts. The effect of increase of SAR of water on the crop yield was not so marked but the combined effect of electrolyte concentration and SAR was quite marked. The source of residual sodium carbonate, whether carbonate or bicarbonate, and the ionic composition of applied water are important. Moreover, it is the nature of the soil and the cumulative effect of a given water on the soil which will determine its effect on the crops. Triangular diagram methods involving the consideration of soil, water and plant may be used in determining the quality of water for irrigation purposes.
W69-07004

THE PROBLEM OF MAKING WASTE WATER SAFE AND ITS USE IN IRRIGATING LIGHT CHESTNUT SOILS IN THE POVOLZHYE AREA,
Volgograd Agricultural Inst. (USSR).
V. F. Shubin.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 405-413, 1968. 9 p, 2 tab.

Descriptors: *Irrigation water, *Water reuse, *Municipal wastes, *Industrial wastes, Water quality, Sewage disposal, Irrigation design, Leaching, Soil-water plant relationships, Water spreading.
Identifiers: *USSR.

Test of flood-irrigation with combined municipal-industrial waste water were made to study infiltration, crop suitability, and salinity hazard of the water. Crops should be fast-growing and shade the soil well to retard evaporation and salinization. Rice and wheat are good early crops, and orchards and vineyards are profitable. Ground cover should be maintained because bare soil evaporation causes salinization. In the test plots there was no problem with salinization; in fact, there was a decrease of salinization and solonchak formation, and a flushing downward of salts. Irrigation of a plot at 3,000 cu m/ha in July 1965 resulted in 62% reduction of alkalinity, 69% Na, and 32% Cl, and a 24% increase in Ca and sulfates in the 0-50 cm layer. (Knapp-USGS)
W69-07005

SALINE SOIL CLASSIFICATION USING THE 5:1 AQUEOUS EXTRACT,
Centro de Edafologia y Biologia Aplicada del Segura, Murcia, (Spain).
O. Carpena, M. G. Guillen, F. G. Fernandez, and M. Caro.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 483-490, 1968. 8 p, 1 fig, 3 tab, 14 ref.

Descriptors: *Saline soils, *Soil types, *Chlorides, *Electrical conductivity, Soil water, Irrigation, Drainage, Saline water, Irrigation water.
Identifiers: *Soil extracts.

Saline soils in SE Spain occupy 10,000 ha and the area is increasing because of improper irrigation techniques and the use of saline irrigation water. Soil salinity was determined by the use of soil extracts. Soil salinity and salinization maps were prepared. Chloride concentrations and electrical conductivity of the extracts were used in a diagram to classify soils. The relationship between salinity of extracts and chloride content was established by regression analysis of over 88 samples. (Knapp-USGS)
W69-07008

SPRAY IRRIGATION OF ORGANIC CHEMICAL WASTES,
Commercial Solvents Corp., Terre Haute, Ind.
For primary bibliographic entry see Field 05D.
W69-07114

EVALUATION OF THE QUALITY OF IRRIGATION WATERS WITH HIGH BICARBONATE CONTENT IN RELATION TO THE DRAINAGE CONDITIONS,
Institute de Edafologia, Maracay (Venezuela). Facultad de Agronomia.
Ildefonso Pla.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 357-370, 1968. 14 p, 3 fig, 4 tab, 12 ref.

Descriptors: *Irrigation water, *Bicarbonates, *Drainage, *Leaching, *Alkaline water, Return flow, Soil water, Soil chemistry, Soil structures, Sodium compounds, Saline soils, Alkaline soils.
Identifiers: *Venezuela, Sodium-bicarbonate water, Sodium hazard, Sodic soils.

In Venezuela, where most of the irrigation waters have a very high bicarbonate content, the actual and potential development of sodic and saline-sodic soils is a limiting factor for the permanence of a successfully irrigated agriculture. Data obtained in laboratory and greenhouse experiments, with very well controlled irrigation and drainage using different soils and waters of different composition were used as a basis for developing a logical and simple method for predicting the effects, and for calculating the leaching requirements to prevent the development of saline-sodic or sodic soils, when waters with high bicarbonate content are used for irrigation. The method is based on the separate calculation of the possible accumulation of the different ions in the soil solution. The influence of the leaching conditions on Na accumulation and structural deterioration was much more marked when waters with high bicarbonate content were used. With irrigation being the only supply of water, the effects on salts and Na accumulation were initially higher in the surface soil, decreasing with depth. These differences were more striking when the physical properties of the soil were favourable for the capillary rise of water. In both cases the Na accumulation was related to the existence of favourable conditions for calcium carbonate precipitation and concentration of salt in the soil solution.
W69-07144

MELIORATIVE EFFECT OF DIRECT ELECTRIC CURRENT ON LEACHING SOLONCHAKOUS SOLONETZ,
Moscow State Univ. (USSR). Faculty of Biology and Soil.
For primary bibliographic entry see Field 02G.
W69-07145

THE SALTING FACTORS OF IRRIGATED SOILS IN THE TURAN PLAIN,
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Institut Pochvovedeniya.
V. M. Borovskiy.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 473-481, 1968. 9 p, 19 ref.

Descriptors: *Saline soils, *Drainage, *Water levels, *Evaporation, *Irrigation, Water quality, Salts, Sodium compounds, Soil types, Chlorides, Groundwater movement, Climates, Arid lands.
Identifiers: *USSR, Turan Plain.

The Turan Plain occupies vast areas of the deserts in Central Asia and South Kazakhstan. More than 60% of the irrigated soils of the USSR are situated here. The climate is continental, with dry, hot and long summers, and short, frosty winters. Potential evaporation is 10 to 20 times larger than the average precipitation. The layer in which migration of the water-soluble salts takes place varies in depth from 100 to a few meters and consists of colluvial gravel covered with loess and alluvium of a binary structure derived from schists. The accumulation of salts in the soil, rocks and water is associated with the natural drainage. In the Piedment region where there is gravel and drainage is adequate, salts do not accumulate and there is no danger of secondary salinization. In the regions with less adequate drainage, there is an accumulation of salts, and secondary salinization is a danger after the development of irrigation. Very large quantities of salts have accumulated in the drainless alluvial-deltaic plains, where a high concentration of salts is found in the groundwater. On irrigation strong salinization takes place. Regulation of the water-salt system is necessary to prevent salinization. The salt reserves and the hydrologic properties of the entire layer from the surface of the soil to the water table must be taken into account.
W69-07146

3D. Conservation in Domestic and Municipal Use

WATER AND WATERCOURSES.
For primary bibliographic entry see Field 06E.
W69-06886

3F. Conservation in Agriculture

WORKSHOP ON WATER RESOURCE PROBLEMS AND RESEARCH NEEDS RELATED TO AGRICULTURE IN THE COASTAL PLAINS OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Water Resources Research Inst.
George Kriz.
Sum of Workshop on Water Resources Probl in NC, Mar 14, 1969, Kinston, NC. 22 p. OWRR Proj No A-999-NC.

Descriptors: *Water resources development, *Planning, *Project planning, *North Carolina, Water requirements, Water utilization, Drainage, Irrigation, Agricultural chemicals, Pesticides, Water pollution, Water supply, Waste disposal.
Identifiers: Water resources research.

A workshop was held to discuss the North Carolina problems of land drainage, irrigation, agricultural chemicals, animal and human wastes, and farm water supplies, to identify and define research needs directed to recognized problems, and to suggest research priorities in these fields. The results of the discussion are summarized and the recommendations are tabulated. (Knapp-USGS)
W69-06945

SOIL AND SALINITY FACTORS IN IRRIGATION AND DRAINAGE OF MALLEE LANDS,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia).
For primary bibliographic entry see Field 02G.
W69-07006

WATER CONSERVATION IN THE SUBHUMID, NORTH LATITUDE PART OF THE CORN BELT OF UNITED STATES,
Agricultural Research Service, Morris, Minn. Soil and Water Conservation Research Div.
R. R. Allmaras, and R. F. Holt.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 291-302, 1968. 12 p, 2 fig, 4 tab, 14 ref.

Descriptors: *Water conservation, *Water storage, *Soil water, *Corn belt, Surface-groundwater relationships, Soil-water-plant relationships, Irrigation, Supplemental irrigation, Crop production, Rainfall.
Identifiers: Soil water storage, Crop geometry.

The northwest Corn Belt of the United States is a subhumid area in which corn and soybean yields are often limited by water deficiency and early-season low temperature. With average midsummer rainfall, as much as 13 cm of water is used from soil storage. The probability of less than 13 cm of stored available water at planting is about 0.25. Soil storage of water was measured in each of 3 dormant-season and 2 growing-season periods. Storage predictions show quantative and systematic aspects of the storage model for each period and over the whole dormant season. Variation of plant spacing and use of temporary field windbreaks change water-use efficiency but do not produce measurable changes of evapotranspiration. Tillages that show both large evaporation (with ample supply of subsoil water) and infiltration rates also produce greater net storage even where no runoff occurs. Water distribution after intake cessation is suggested as a limiting factor for water storage. A tilled layer water storage model suggests limits on the possible value of tillage for increasing water storage.
W69-07141

THE EFFECT OF GYPSUM ON THE WATER STORAGE IN A SANDY LOAM SOIL UNDER AN IRRIGATED PERENNIAL PASTURE,
Commonwealth Scientific and Industrial Research Organization, Riverina (Australia). Riverina Lab.
B. J. Bridge, and C. R. Kleinig.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 313-323, 1968. 11 p, 1 fig, 3 tab, 14 ref.

Descriptors: *Water storage, *Irrigation water, *Water yield improvement, *Soil treatment, Gypsum, Soil amendments, Ion exchange, Soil structure, Hydraulic conductivity, Permeability, Infiltration.
Identifiers: *Australia, Soil water storage improvement.

White clover (Trifolium repens L.) was grown at three irrigation frequencies with and without a top dressing of gypsum applied at 10 metric tons/ha, on a coarse textured soil which had a sandy loam A horizon of 15 cm depth underlain by a sandy clay B horizon of low hydraulic conductivity. Field measurements showed that gypsum application significantly increased the soil moisture storage before and after irrigation at all irrigation frequencies, but had no effect on the bulk density of the soil profile. Laboratory measurements showed that gypsum application increased the hydraulic conductivity of the subsoil, increased the exchangeable calcium in the soil profile, and decreased the exchangeable sodium plus magnesium. These soil changes were accompanied by significantly increased production of white clover. At a 7-day irrigation interval, the average growth rate rose from 18.0 to 43.4 kg/ha/day. At each irrigation frequency, the water increment in the soil profile at irrigation was similar for both gypsum and nil gypsum treatments, indicating that gypsum application resulted in an increased efficiency of use of applied irrigation water in terms of clover production.
W69-07142

THE ACHIEVEMENTS OF DRAINAGE THEORY IN RELATION TO PRACTICAL NEEDS: TAKING STOCK,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
For primary bibliographic entry see Field 02G.
W69-07143

WATER CAPTURE IN SOIL SURFACE MICRODEPRESSIONS FOR CROP USE,
Agricultural Research Service, State College, Miss.; and Agricultural Research Service, Watkinsville, Ga. Soil and water Conservation Research Div.
R. R. Bruce, D. L. Myhre, and J. O. Sanford.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 325-330, 1968. 6 p, 1 fig, 1 tab, 4 ref.

Descriptors: *Water conservation, *Infiltration, *Cultivation, *Depression storage, Droughts, Southeast U.S., Crop production, Crop response, Surface-groundwater relationships, Runoff, Soil physical properties.
Identifiers: Soil surface roughening, Infiltration improvement.

Because the relatively abundant rainfall in the Southeastern United States is often unevenly distributed, water for plant growth may not be naturally sufficiently available at times when it is most needed by crops. This problem could be partly alleviated if a method were developed for retaining more rainfall for a longer time in the soil profile. Experiments compared rough and smooth soil surfaces on a Vertic Haplaquoll soil in Mississippi. The purpose of these studies was to investigate the possibility that a rough soil surface would increase surface detention of water and subsequent soil water supply for crop use. The rough surface was created by spading the interrow zone a few days after planting corn, the test crop; smooth surface plots were conventionally disked. In 1 of 2 years, the rough soil surface resulted in significantly greater corn yields. Associated with the yield increase was a larger amount of soil water in the profile during the critical water requirement period of meiosis and anthesis. It may be concluded that the greater depression storage capacity of the rough surface led to an increased amount of rainfall captured, infiltrated, and temporarily stored in the soil for plant use.
W69-07149

ECONOMIC ASPECTS OF WATER RESOURCE POLICY,
Wisconsin Univ., Milwaukee.
For primary bibliographic entry see Field 06B.
W69-07159

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

DRAINAGE AND RECLAMATION OF LANDS.
For primary bibliographic entry see Field 06E.
W69-06872

FINDLEY LAKE PROPERTY OWNERS, INC V TOWN OF MINA (COMPETING USES).
For primary bibliographic entry see Field 06E.
W69-06873

WHEATLEY V CASS COUNTY (ACTION TO PREVENT CONSTRUCTION OF DRAINAGE CULVERT UNDER HIGHWAY).
For primary bibliographic entry see Field 06E.
W69-06877

HUNT V SMITH (DAMAGE BY OBSTRUCTION TO NATURAL FLOW).
For primary bibliographic entry see Field 06E.
W69-06878

AMORY V COMMONWEALTH (DAMAGES FOR DIVERSION).
For primary bibliographic entry see Field 06E.
W69-06879

JONES V PENNSYLVANIA RR (DAMAGES CAUSED BY DIVERSION OF WATER).
For primary bibliographic entry see Field 06E.
W69-06891

WHITE V WABASH RR (ACTION FOR DAMAGES DUE TO ALLEGED DIVERSION OF SURFACE WATERS).
For primary bibliographic entry see Field 06E.
W69-06895

FULTON V TOWN OF BELMONT (DAMAGE FROM OVERFLOW OF STORM DRAINS).
For primary bibliographic entry see Field 06E.
W69-06896

FLOOD COVERAGE: NEW CHALLENGE FOR INSURANCE.

J of Amer Ins, Vol 45, No 2, pp 13-16, Mar-Apr 1969. 4 p, 2 pic.

Descriptors: *Flood plain insurance, *Flood damage, Flood control, Flood protection, Risks, Cost sharing, Federal government, Local governments, Feasibility studies, Nonstructural alternatives, Disasters, Land use, Land development, Legislation, Legal aspects, State governments.

The struggle to provide a feasible insurance program to aid flood victims has been a long and difficult one. Steadily mounting flood losses have kept the idea of a flood insurance program alive. The activities of the Department of Housing and Urban Development, the National Association of Insurance Commissioners, and members of the property insurance industry have resulted in the National Flood Insurance Act of 1968 which authorized the Secretary of HUD to borrow up to $250 million to implement a flood insurance pro-

gram. The Act requires that state and local governments cooperate by adopting and enforcing land use provisions to restrict future development of land in flood-prone areas in order not to perpetuate the current problem. Under the program, flood insurance will be sold and claims serviced by private insurance companies. The federal government will assist property owners by paying a share of the determined premiums and providing reinsurance, which will be purchased by the companies as a means of protecting themselves and their policyholders against catastrophic losses. (Carruthers-Fla)
W69-06898

CITY OF PASSAIC V CITY OF CLIFTON (COORDINATED FLOOD CONTROL PLANS).
For primary bibliographic entry see Field 06E.
W69-06901

JACOBSON V KANDIYOHI (CONSTRUCTION OF A DRAINAGE DITCH).
For primary bibliographic entry see Field 06E.
W69-06903

BUNDY V CITY OF SULLIVAN (ARTIFICIAL CONTROL OF SURFACE DRAINAGE).
For primary bibliographic entry see Field 06E.
W69-06910

DANZIGER V UNITED STATES (EMINENT DOMAIN FOR LEVEE CONSTRUCTION).
For primary bibliographic entry see Field 06E.
W69-06919

PASSAIC VALLEY FLOOD CONTROL COMM'N; FLOOD CONTROL.
For primary bibliographic entry see Field 06E.
W69-06921

FLOOD CONTROL.
For primary bibliographic entry see Field 06E.
W69-06922

FLOOD CONTROL AND BEACH EROSION: STATE ASSISTANCE.
For primary bibliographic entry see Field 06E.
W69-06940

FLOOD CONTROL AND BEACH EROSION (STATE ASSISTANCE).
For primary bibliographic entry see Field 06E.
W69-06941

FLOOD PLAIN INFORMATION STUDY, JACKSON, TENNESSEE.
Corps of Engineers, Memphis, Tenn.

Corps Eng Flood Plain Rep, May 1967. 23 p, 5 plate, 3 photo, 35 ref, tech append. Prepared for Jackson Municipal Regional Planning Comm.

Descriptors: *Floods, *Flood damage, *Tennessee, Flood plains, Flood control, Non-structural alternatives, Maximum probable flood, Historic flood.
Identifiers: Forked Deer River (Tenn), Jackson (Tenn), Standard project flood, Intermediate regional flood.

Flooding of the South Fork of the Forked Deer River, North Fork Drainage Canal, and Bond Creek, Jackson, Tennessee is described in a report of flood plain problems based on records of rainfall, runoff, and historical and present flood heights. Maps, photographs, profiles, and cross sections indicate the extent of flooding that has occurred and which may be expected to occur in the future. The information is for use in study and planning ways to minimize vulnerability to flood damages by control of flood plain use by zoning and subdivision regulations, the construction of flood protection works, or by combinations of these approaches. (Knapp-USGS)
W69-07013

GULF REFINING CO V DAVIS (SEEPAGE FROM A SALT WATER PIT).
For primary bibliographic entry see Field 06E.
W69-07016

HOLLIDAY V CITY OF GREENVILLE (ALTERATION OF NATURAL DRAINAGE CONDITIONS).

78 SE 2d 279-289 (S C 1953).

Descriptors: *South Carolina, *Surface drainage, *Storm drains, *Flood damage, Surface runoff, Damages, Erosion, Cities, Drainage, Floods, Repulsion (Legal aspects), Storm runoff, Surface waters, Outlets, Ditches, Discharge (Water), Legislation, Flow augmentation, Alteration of flow, Natural flow, Judicial decisions, Value, Drainage engineering, Drainage effects.

Respondent owned land situated in appellant city. Prior to 1950, drainage water from the surrounding public streets and respondant's land flowed over and off the land causing no harm. In 1950 appellant constructed curbs, gutters, and drainage basins which caused drainage water to be concentrated and discharged in greater volumes across respondent's land. This condition greatly reduced the value of respondent's tract. A statute required the city to provide adequate drainage, and such drainage was to be provided along a public thoroughfare, not over private land adjacent thereto unless the owner consented. From a judgment for respondent, the city appealed. The court held that the damage to respondent's land resulted from destruction of the natural drainage by the city's employees. The court noted that a city is not necessarily liable for damage from a change in a drainage system; it is liable, however, if the natural drainage is destroyed. The measure of damages in such a case is not the increase in amount of water flowing on the land; rather, it is the amount of damage from the increase in flow with due regard for the adequate drainage prior to the change. (Helwig-Fla)
W69-07018

COSTANZO V STATE (CONTROL OF SURFACE WATERS AND THE NATURAL FLOW DOCTRINE).
207 Misc 242, 137 NYS 2d 878-885 (N Y Ct Cl 1955).

Descriptors: *New York, *Natural flow, *Flood damage, *Surface waters, Excessive precipitation, Obstruction to flow, Judicial decisions, Drainage, Ditches, State governments, Surface runoff, Pipes, Culverts, Muck lands, Construction, Surface drainage, Drainage water, Storm runoff, Floods protection, Highways, Legal aspects.
Identifiers: Proximate cause.

Plaintiffs brought suit to recover for flood damage allegedly caused by defendant's construction of a highway. Plaintiffs could only recover if they showed that defendant collected a body of surface water which would not naturally flow toward plaintiffs' lands, and further, that such waters were cast upon plaintiffs' lands. On the basis of substantial expert testimony, the court entered a judgment in favor of the defendant. The evidence indicated that defendant was not negligent and, in fact, that it was careful to design its highway in such a way as to take advantage of the natural flow of surface waters. Defendant did not alter the natural flow but merely increased its volume; for this there is no liability. The court further found that the flooding of the plaintiffs' land was caused by excessive precipitation, thus breaking the causal connection between defendant's activities and the ultimate damage to the plaintiff. (Stewart-Fla)
W69-07023

ATKINSON V UNITED STATES (FEDERAL LIABILITY FOR DAM BACKWATER).
For primary bibliographic entry see Field 06E.
W69-07025

HURD V STATE (NEGLIGENT DISCHARGE OF CANAL WATER).

64 NYS 2d 896-902 (Ct Cl 1946).

Descriptors: *New York, *Flood damage, *Floodgates, *New York State Barge Canal, Flooding, Damages, Judicial decisions, Streams, Canals, Orchards, Legal aspects, Obstruction to flow, Ice, State governments, Barriers, Diversion, Discharge (Water), Prescriptive rights, Easements.
Identifiers: Res ipsa loquitur, Presumptions.

Plaintiffs sought to recover for damages allegedly caused by the State of New York when barge canal gates were opened and water was discharged into a frozen creek which subsequently overflowed and damaged plaintiffs' cherry trees. The state did not have a prescriptive right to flood plaintiffs' land. Plaintiff contended that the state was negligent in allowing the canal water to rise to abnormal height before discharging and in opening all the canal gates simultaneously so as to discharge unnecessarily large volumes of water into the stream. The court held the state liable, applying the doctrine of res ipsa loquitur since the barge canal gates were in the exclusive control of the state, the evidence showed the accident would not have occurred without negligence, and no explanation was forthcoming from the state. (Kahle-Fla)
W69-07027

ALTERATION OF HIGHWAYS.

Conn Gen Stat Ann sec 13a-128, 13a-136, 13a-138 (1958), as amended, (Supp 1968).

Descriptors: *Connecticut, *Surface drainage, *Reservoir construction, *Flood control, Legislation, Highways, Road construction, Dike embankments, Dams, Diversion structures, Flood protection, Drainage water, Controlled drainage, Cost allocation, Cost-benefit ratio, Reservoirs, Tidal effects, Overflow, Water supply, Cities, Highway relocation.

Any municipal or private corporation which provides a town's water supply may, if necessary, apply to the governing council of any town to have the use of any public highway discontinued or altered in order to enable it to construct or enlarge a reservoir. If the council denies the application or fails to act upon it for thirty days, the corporation may petition the superior court, stating that such discontinuance is essential to the public interest. Whenever a town lays out a public highway across lowlands which are susceptible to tide overflow and the highway is used as a dike to prevent such overflow, the owners may be assessed for the benefits; however, not more than one-half the cost of the highway shall be assessed to the owners. Any person authorized to construct or repair highways may drain any imposing waters onto private lands, but such drainage must be done in a manner causing the least damage. However, no drainage is allowed into the yard of any residence or areas used exclusively for the storage and sale of foods. (Stewart-Fla)
W69-07053

DRAINAGE SYSTEMS.
For primary bibliographic entry see Field 06E.
W69-07064

GAITHER V ALBEMARLE HOSP (OBSTRUCTION TO NAVIGABLE STREAM AS A PUBLIC NUISANCE).
For primary bibliographic entry see Field 06E.
W69-07079

FLOOD PLAIN INFORMATION, LAGUNA CANYON, ORANGE COUNTY, CALIFORNIA.
Corps of Engineers, Los Angeles, Calif.

Corps Eng Flood Plain Rep, Mar 1969. 31 p, 18 fig, 24 plate, 5 tab.

Descriptors: *Floods, *Flood damage, *California, Flood plains, Flood control, Non-structural alternatives, Maximum probable flood, Historic flood.
Identifiers: Orange County (Calif), Laguna Canyon, Standard project flood, Intermediate regional flood.

Flooding of Laguna Canyon, Orange County, California is described in a report of flood plain problems based on records of rainfall, runoff, and historical and present flood heights. Maps, photographs, profiles, and cross sections indicate the extent of flooding that has occurred and which may be expected to occur in the future. The information is for use in study and planning ways to minimize vulnerability to flood damages by control of flood plain use by zoning and subdivision regulations, the construction of flood protection works, or by combinations of these approaches.
W69-07106

FLOOD PLAIN INFORMATION, CAGUITAS RIVER, CAGUAS, PUERTO RICO.
Corps of Engineers, Jacksonville, Fla.

Corps Eng Flood Plain Rep, Jan 1969. 33 p, 7 fig, 12 plate, 5 tab.

Descriptors: *Floods, *Flood damage, *Puerto Rico, Flood plains, Flood control, Non-structural alternatives, Maximum probable flood, Historic flood.
Identifiers: Caguas (PR), Caguitas River, Standard project flood, Intermediate regional flood.

Flooding of the Caguitas River, Caguas, Puerto Rico, is described in a report of flood plain problems based on records of rainfall, runoff, and historical and present flood heights. Maps, photographs, profiles, and cross sections indicate the extent of flooding that has occurred and which may be expected to occur in the future. The information is for use in study and planning ways to minimize vulnerability to flood damages by control of flood plain use by zoning and subdivision regulations, the construction of flood protection works, or by combinations of these approaches.
W69-07107

FLOOD PLAIN INFORMATION, OUACHITA RIVER, ARKADELPHIA, ARKANSAS.
Corps of Engineers, Vicksburg, Miss.

Corps Eng Flood Plain Rep, Feb 1969. 35 p, 20 fig, 8 plate, 5 tab.

Descriptors: *Floods, *Flood damage, *Arkansas, Flood plains, Flood control, Non-structural alternatives, Maximum probable flood, Historic flood.
Identifiers: Arkadelphia (Ark), Ouachita River, Standard project flood, Intermediate regional flood.

Flooding of the Ouachita River, Arkadelphia, Arkansas is described in a report of flood plain problems based on records of rainfall, runoff, and historical and present flood heights. Maps, photographs, profiles, and cross sections indicate the extent of flooding that has occurred and which may be expected to occur in the future. The information is for use in study and planning ways to minimize vulnerability to flood damages by control of flood plain use by zoning and subdivision regulations, the construction of flood protection works, or by combinations of these approaches. (Knapp-USGS)
W69-07108

FLOOD PLAIN INFORMATION, FEATHER RIVER, NICOLAUS, CALIFORNIA.
Corps of Engineers, Sacramento, Calif.

Corps Eng Flood Plain Rep, Nov 1968. 35 p, 10 fig, 12 plate, 8 tab.

Descriptors: *Floods, *Flood damage, *California, Flood plains, Flood control, Non-structural alternatives, Maximum probable flood, Historic flood.
Identifiers: Feather River, Nicolaus (Calif), Standard project flood, Intermediate regional flood.

Flooding of the Feather River, Nicolaus, California is described in a report of flood plain problems based on records of rainfall, runoff, and historical and present flood heights. Maps, photographs, profiles, and cross sections indicate the extent of flooding that has occurred and which may be expected to occur in the future. The information is for use in study and planning ways to minimize vulnerability to flood damages by control of flood plain use by zoning and subdivision regulations, the construction of flood protection works, or by combinations of these approaches. (Knapp-USGS)
W69-07127

UNITED STATES V HUGHES (FLOWAGE EASEMENT).

408 F 2d 619-621 (6th Cir 1969).

Descriptors: *Tennessee, *Easements, *Tennessee Valley Authority Project, *Dams, Reservoirs, Backwater, Floods, Streams, Water level fluctuations, Riparian rights, Riparian lands, Proprietary power, Real property, Judicial decisions, Legal aspects, Flow.

The TVA brought action as grantee of a flowage easement to require the defendant landowner to remove certain house trailers situated within the boundaries of that easement. The easement was procured from the defendant's predecessor in title and was properly recorded in the year of its purchase. The purpose of the easement was to provide the TVA with the permanent right to overflow the area with backwater impounded by a dam across the Watuga River. The court found that the house trailers had become immobile structures on the easement and that their presence materially violated the purpose of the easement. The court noted that the TVA purchased the easement for the purpose of flood control and that this objective could hardly be accomplished if the area into which flood waters were to be diverted had private dwellings thereon. The court held that the defendant had constructive notice of the recorded easement and remanded the case to the district court for further proceedings. (Katz-Fla)
W69-07200

OBSTRUCTIONS.
W Va Code Ann sec 17-16-1 (1966), as amended, (Supp 1968).

Descriptors: *West Virginia, *Obstruction to flow, *Drainage water, *Diversion structures, Ditches, Channels, Legislation, Drainage, Administrative agencies, Surface drainage, Alteration of flow, Natural flow doctrine, Watercourses, Surface runoff, Drainage systems, Barriers, Abatement, Highways, Legal aspects.
Identifiers: Injunctions (Prohibitory).

'Obstructions,' within the meaning of the statute, include ashes, earth, stone or other material placed on a public road, or in any ditch or waterway along such road. Water diverted from its regular course or channel so as to injure or endanger a public road is an obstruction. Also included within the definition of an obstruction is any road connected without lawful authority to a public road so as to obstruct or impede the flow of water in drains alongside the road. Such obstructions are declared to be public nuisances, and the county court or State Road Commission may apply to a court of competent jurisdiction for an injunction to abate such nuisance. (Stewart-Fla)
W69-07216

SLACK-WATER DAMS (NATURAL RESOURCES ACT).

W Va Code Ann sec 20-5-6 through 20-5-13 (1966).

Descriptors: *West Virginia, *Natural resources, *Water conservation, *Dams, Ponds, Rivers, Lakes, Surface waters, Bridges, Culverts, Highways, Road construction, Water storage, Reservoirs, Dam construction, Damsites, Legal aspects, Legislation, Project planning, Administrative agencies, Water supply, Cost allocation.
Identifiers: *Slack-water dams.

The Director of the Department of Natural Resources may request the State Road Commissioners to construct and maintain slack-water dams in connection with construction of public highways, bridges, culverts, or viaducts. The purpose of the slack-water dams is to create reservoirs, ponds, water parks, basins, lakes, or other incidental works to conserve the water supply of the state. Upon approval by the public authority in charge of construction, the director, state road commissioner, and the authority shall cooperate in formulating plans and in distributing costs for the dam construction. Any department of state government, county, city, park board, organization, corporation, or person may petition for construction of slack-water dams. The Director may review such petitions. The Director is responsible for supervision and care of all slack-water dams and reservoirs, ponds, basins, and lakes created by the dams. The projects may be maintained by leasing operators, but title to or lease of the lands and waters, and related riparian rights will otherwise be retained by the Division. Plans for new highways and bridges are to be coordinated with existing projects. (Kelly-Fla)
W69-07220

UNITED STATES V VIRGINIA ELECTRIC AND POWER CO (COMPENSATION FOR GOVERNMENT CONDEMNATION OF A FLOWAGE EASEMENT).

365 U S 624-645 (1961).

Descriptors: *Federal government, *Easements, *Condemnation value, *Navigable waters, Eminent domain, Compensation, Legal aspects, Land tenure, Project planning, Water utilization, Hydroelectric plants, Flow, Judicial decisions.
Identifiers: *Flowage easements, *Dominant servitude, *Roanoke River, *Subservient fee, Navigational servitude.

Under congressional authorization of a dam project, the federal government acquired a flowage easement over a tract of land. Respondent power company held a flowage easement over a tract within the tract appropriated by the government, and its easement was destroyed by the appropriation. In condemnation proceedings in district court, respondent received substantial damages. The court of appeals affirmed. On appeal to the U S Supreme Court the government claimed that respondent's easement had no compensible value when appropriated by the United States. The Supreme Court held that although the government had a 'dominant navigational servitude' to appropriate navigable waters to its use without compensation, no such right extended to fast lands. Compensation for fast lands taken by the government must be based on possible use not connected with the flow of the navigable stream appropriated. The Court felt the value of respondent's easement equaled the value of the subservient fee, since it had complete destructive control over the fee. The Court felt the value was the 'nonriparian' value of the servient land discounted by the improbability of the easement's exercise, with no weight given the

prospect of government appropriation. The cause was remanded for redetermination of damages. Three justices dissented in favor of the government view. (Harris-Fla)
W69-07221

CONNECTICUT RIVER FLOOD CONTROL COMMISSION.

Conn Gen Stat Ann sec 25-99 (1960).

Descriptors: *Connecticut, *Legislation, *Interstate compacts, *Interstate rivers, Interstate commissions, New Hampshire, Vermont, Massachusetts, Dams, Hydraulic structures, Reservoirs, Dikes, Levees, Flood protection, Flood control, Runoff, Public health, Public benefits, State governments, Water resources development, Federal government, United States, Streams, Hydroelectric power, Recreation, Water supply, Watersheds (Basins), Government finance, Taxes.

The Connecticut River Valley Flood Control Commission was established by this interstate compact to assure adequate storage capacity for impounding the waters of the Connecticut River and its tributaries in order to insure the protection of life and property from floods. The twelve member Commission is a politico-corporate entity endowed with full legal personality. New Hampshire, Vermont, Massachusetts, and Connecticut are equally represented on the Commission. The compact recognizes that construction by the United States of dams and reservoirs along the river valley will result in removal of certain lands from the tax rolls of the situs state. In order to compensate for tax losses, the compact provides that the states benefitted by such construction shall reimburse the situs state for a fixed percentage of such loss. Upon request of the governor of the damaged signatory state, the Commission shall assess the loss based on the current tax rate and request the appropriate state to make payment. A lump sum settlement may be negotiated by the Commission between the signatories involved. The Commission is also directed to undertake water control studies in coordination with the Corps of Engineers. (Katz-Fla)
W69-07222

MUNICIPAL FLOOD AND EROSION CONTROL BOARDS.
Conn Gen Stat Ann secs 25-84 to 25-86, 25-94 to 25-98 (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Erosion control, *Flood control, Cities, *Local governments, Cities, Legislation, State governments, Federal government, Control structures, Construction, Assessments, Construction costs, Procurement, Condemnation, Administrative agencies, Eminent domain, Legal aspects.
Identifiers: Flood control systems, Inter-agency agreements, Inter-governmental agreements.

Any municipality may adopt the provisions of this section and exercise through a flood and erosion control board the powers granted thereunder. Such board may construct and maintain a flood or erosion control system and is authorized to acquire real property for such a purpose by sale or condemnation. Construction costs may be defrayed by bond issues, special assessments, or from general taxation. A board may enter agreements with the state, the United States, or both in order to satisfy conditions for systems improving navigation or for flood protection, provided such systems are approved by the water resources commission. The state may enter such agreements through the water resources commission which shall have direct control over plans and specifications. State contracts must be approved by the attorney general. Two or more municipalities may carry out projects jointly. Local authorities may accept gifts to be applied to such projects. (Kahle-Fla)
W69-07223

CARROLL V HOPPE (RIGHT OF A RIPARIAN OWNER TO CONSTRUCT A JETTY).

123 N Y S 2d 244-246 (N Y Sup Ct 1953).

Descriptors: *New York, *Riparian rights, *Navigable waters, *Jetties, Recreation, Fishing, Swimming, Bays, Beaches, High water mark, Tides, Naviagation, Water delivery, Water supply, Recreation demand, Public rights, Permits, Cities, Public lands, Legal aspects, Judicial decisions.
Identifiers: Injunctions (Mandatory).

Plaintiff and defendant were adjoining property owners. Plaintiff brought suit to compel defendant to remove a jetty which he had constructed over the foreshore fronting of his property and extending outwards from the high water mark. Defendant had received a permit to build the jetty for the purpose of protecting the water line which conducted the fresh water supply to his property. The foreshore over which the jetty was constructed belonged to the city which had granted the permit. The court held that defendant has the right as a riparian owner to build any structure on the foreshore of his land as long as he does not interfere with the public right of navigation, access to the water for fishing, bathing and other lawful purposes to which passage over the beach may be necessary. The court stated that the plaintiff failed to show that the jetty violated the rights of the public or that the jetty constituted a nuisance or an appropriation of public lands. The court awarded judgment for the plaintiff. (Shevin-Fla)
W69-07230

KENNEBEC TOWING CO V STATE (COLLISION WITH UNDERWATER OBSTRUCTION).

52 A 2d 166-171 (Me 1947).

Descriptors: *Maine, *Bridges, *Navigable rivers, *Boats, Piers, Transportation, Damages, Channels, Channel improvement, Rivers, Tides, Abatement, Underwater, Legal aspects, Judicial decisions, Accidents, Navigation, State governments, Currents (Water).
Identifiers: *Tugboats, *Obstruction to navigation, Towing, Negligence, Barges.

Plaintiff brought this action against the state for damages suffered by plaintiff's tugboat in a collision with an alleged underwater obstruction in the draw channel of a bridge. A jury awarded damages to the plaintiff, and the state moved for a new trial. The state contended that negligence by the captain of the tug was the direct and proximate cause of the accident. The court held that plaintiff had the burden of proving by a preponderance of the evidence that the accident was caused by defendant's negligence and that it was in no way contributorily negligent. The court declared the standard to be that of the reasonable prudent man. The court held that the state had to show that the jury's verdict was so manifestly incorrect as to necessarily have been attributable to prejudice or bias. The court stated that navigable rivers are common highways and may be used as any other highway is used. It may be negligence to have a concealed obstruction in a navigable channel. The duty of a tugboat captain is to exercise reasonable care, caution, and maritime skill. The court held that all the issues in the case were contested and that the jury was in the best position to weigh the facts and render an impartial verdict. The court upheld the jury verdict for plaintiff. (Shevin-Fla)
W69-07233

LOVIN V TOWN OF HAMLET (ATTRACTIVE NUISANCE DOCTRINE APPLIED TO ARTIFICIAL LAKE).

243 N C 399, 90 SE 2d 760-764 (1956).

Descriptors: *North Carolina, *Drowning, *Recreation facilities, *Lakes, Legal aspects, Hazards, Damages, Safety, Cities, Parks, Barriers, Judicial decisions, Dams.
Identifiers: *Attractive nuisance, *Wrongful death action, *Artificial lakes, *Negligence.

Defendant municipality created an artificial lake by damming; also constructed were a public park with a playground, wading pool, and other facilities, adjacent to the lake. Plaintiff's intestate, a boy of seven years, was alleged to have been attracted to the deep water of the lake where he subsequently drowned. Plaintiff alleged that the park and unfenced lake constituted an attractive nuisance of which defendant was aware, or through due diligence should have been aware. Thus, plaintiff charged defendant municipality with negligence in an action brought under a wrongful death statute. On appeal from denial of defendant's demurrer, the Supreme Court held that the complaint failed to state a cause of action on two points: it did not allege how, where, or under what circumstances the intestate fell into the water; it did not allege that children were accustomed to wade or play in and around the lake so as to put defendant on notice. The court held it was not negligence per se to maintain an unenclosed pond. The court also held that the attractive nuisance doctrine could not be applied to the park facilities under the circumstances since no inujury occurred on the facilities. (Harris-Fla)
W69-07236

UNITED STATES V FEDERAL POWER COMMISSION (FEDERAL POWER COMMISSION AUTHORITY OVER PROJECT LICENSING).

191 F 2d 796-809 (4th Cir 1951).

Descriptors: *Federal project policy, *Federal power act, *Hydroelectric project licensing, *Flood control, Legal aspects, Dams, Federal government, Permits, North Carolina, Judicial decisions, Dam construction, Water resources development.
Identifiers: *Roanoke Rapids project, *Federal Power Commission, *Flood control act of 1944.

Petitioners (Secretary of Interior and a cooperative electric company) sought an order setting aside the grant of a license by the Federal Power Commission to a private power company to construct a dam on the Roanoke River. Petitioners contended the FPC cannot grant such a license because the Flood Control Act of 1944 removed that power from FPC control. The court of appeals held that the Secretary had no power to determine when the development of water resources should be undertaken by the United States and withheld from private companies; only Congress and its delegate, the FPC, were charged with that power. The Secretary had no authority to intervene on behalf of the United States in these matters. Under the Federal Power Act, the FPC may issue licenses and thereby regulate water development. Only when Congress expressly or impliedly removes a project from FPC jurisdiction is this power limited. The FPC approved the general Flood Control Act but did not put the project completely under federal control. The court held that the general plan was to be supplemented by discretionary licensing by the FPC--not completely relegated to United States control. (Harris-Fla)
W69-07240

UNITED STATES V GENERAL BOX CO (CONDEMNATION OF LAND FOR LEVEE PURPOSES).

224 F 2d 7-21 (5th Cir 1955).

Descriptors: *Louisiana, *Eminent domain, *Levees, *Compensation, Mississippi River, Federal government, Navigable waters, United States, Rivers, Lumber, Condemnation, Public lands, Dikes, Flood control, Administrative agencies, Judicial decisions, Riparian land, Legal aspects, Relative rights, Right-of-way, Land, Beds.
Identifiers: *Riparian servitudes.

Plaintiff was the owner of timber located on land used by the United States to enlarge a levee on the Mississippi River. The state levee board exercised a riparian servitude to acquire the land for levee purposes and then donated the land to the United States in accordance with a state statute and the state constitution. The owners of the land were notified but plaintiff was not. The United States, through its servants, entered the land and destroyed the timber. Plaintiff brought action to recover the value of the timber. From a judgment for plaintiff in the trial court, the United States appealed. The circuit court held the United States was not liable for the timber because it had received the right-of-way from the state which had correctly appropriated the tract, without compensation, under a riparian servitude. The property was not taken by expropriation; rather, a public use was made of a public right-of-way. No notice was required to be given to plaintiff. In addition, the court found that the timber had been located on batture and that the constitution did not allow payment for destruction of batture or of timber located thereon. (Helwig-Fla)
W69-07242

GENERAL BOX CO V UNITED STATES (RECOVERABLE DAMAGES FROM LEVEE CONSTRUCTION).

107 F Supp 981-988 (W D La 1952).

Descriptors: *Louisiana, *Levees, *United States, *Eminent domain, Damages, Mississippi River, Judicial decisions, Legal aspects, Public benefits, Remedies, Riparian land, Flood control, Trees, Construction, Administrative agencies, Right-of-way, Federal government, Compensation, State governments, Condemnation.
Identifiers: Due process (Procedural).

Plaintiff owned timber land on the Mississippi River which was destroyed by defendant's enlargement of a levee on the main stream. The Fifth Louisiana Levee District had agreed, in compliance with the Flood Control Act, to obtain rights-of-way along the river for the United States. The district failed to comply with the strict guidelines of the state constitution and statutes which dealt with the procedures to be followed in taking lands for levee purposes. As provided by state statute, if the owner and the district disagree on the price to be paid for the owner's property, a trial on the issue should be held. Plaintiff disagreed as to the price to be paid for his timber, and no trial was held. Plaintiff then sought to recover the price of the timber from the federal government. The court allowed plaintiff's claim. The court based its decision on the Fifth Amendment to the Federal Constitution which prohibits the taking of property for public use without just compensation. Even though the rights-of-way were issued to the defendant by the levee district, if they were invalid, the defendant is liable. (Holt-Fla)
W69-07243

CENTRAL NEW YORK BROADCASTING CORP V STATE (SUIT TO RECOVER DAMAGES FOR NEGLIGENCE OF STATE IN FLOOD CONTROL PROJECT).

206 Misc 101, 132 N Y S 2d 12-15 (Ct Cl 1954).

Descriptors: *New York, *Flood control, *Channel improvement, *State jurisdiction, State governments, Federal government, Drainage districts, Levees, Drainage systems, Floodwater, Flood damage, Overflow, Erosion, Obstruction to flow, Water spreading, Rain, Channels, Surface runoff, Legal aspects, Judicial decisions, Flow augmentation, Construction, Excessive precipitation.

Plaintiff brought this claim to recover for damage sustained by reason of the alleged negligence of the State of New York in carrying out a flood control project. The construction of a new channel to carry water resulted in the formation of a bottleneck in the old channel. Work stopped for a time on the new channel, and when the annual spring floods came the old channel was unable to carry water as it had in the past. This resulted in an overflow of great quantities of water running at a rapid rate to a lower level. This swift running water eroded much of plaintiff's property. The court affirmed a finding that the state was negligent in its construction of the outlet from the channel. The state was held liable for damages because it owned the land used for the project, the plans for construction were defective, and the work was inherently dangerous. Furthermore, the court held that even though this was a joint venture involving the state and federal governments, the state's responsibility could not be delegated. (Logan-Fla)
W69-07244

PERKINS V PALO ALTO COUNTY (SUIT FOR INJUNCTION REQUIRING COUNTY TO CONSTRUCT A CULVERT).
60 NW 2d 562-566 (Iowa 1953).

Descriptors: *Iowa, *Watercourses (Legal), *Culverts, *Highways, Roads, Graded, Surface drainage, Surface waters, Alteration of flow, Natural streams, Ditches, Drainage systems, Floods, Local governments, Legal aspects, Judicial decisions, Remedies, Damages, Land tenure, Diversion, Road construction.
Identifiers: Injunctions (Mandatory).

Plaintiff landowner brought this suit seeking a mandatory injunction requiring defendant to put a culvert through road adjacent to plaintiff's land so as to divert water into a natural watercourse. Defendant had constructed a road which blocked the natural course of surface waters across property subsequently purchased by plaintiff and had diverted that water along a road ditch running around the property. Plaintiff's predecessor in title had requested that this ditch be constructed and acquiesced in its use. When plaintiff bought the property, he knew of the old watercourses as well as the existing ones. The court ruled that the roadside ditch had become the natural watercourse and that plaintiff was not entitled to have a culvert constructed through the road in order to divert water back into the old watercourse. The court further held that the fact that watercourse would flood plaintiff's property if debris was not removed from the channel would not support an order for construction of a culvert. (Logan-Fla)
W69-07245

UNITED STATES V DICKINSON (SUIT TO RECOVER VALUE OF LAND FLOODED BY THE FEDERAL GOVERNMENT).

331 U S 745-751 (1947).

Descriptors: *West Virginia, *Flooding, *Condemnation, *Public rights, Dams, Eminent domain, Cost repayment, Soil erosion, Damages, Flood damage, Land reclamation, Easements, Judicial decisions, United States, Federal government, Developed waters, Water resources development, Compensation, Condemnation value, Landfill.
Identifiers: Statute of limitations.

Plaintiff brought this suit to recover for the value of easements taken by the federal government. Without condemning land, the government built a dam on a river and raised the water level so as to flood a part of respondents' land. More than six years after the dam was built, but less than six years after the water reached its highest level, respondents sued for compensation. The court held that they were not barred by the six years statute of limitations. When the government chooses to take land by physical processes rather than by condemnation, the owner is not required to resort to piecemeal or premature litigation to determine what is 'taken.' The court also held that when part of a tract is taken by flooding, compensation is due for any erosion to the remaining part of the tract proximately caused by such flooding. Compensation is payable in full for the amount of land taken even if the owner later, with the consent of the government, fills the land. The court found that the landowner was entitled to compensation for an easement for intermittent flooding above the new permanent water level. (Kelly-Fla)
W69-07246

GOODYEAR TIRE AND RUBBER CO OF ALABAMA, INC V GADSDEN SAND AND GRAVEL CO, INC (UNDERSEEPAGE AND WATER FLOWAGE).

27 So 2d 578-584 (Ala 1946).

Descriptors: *Alabama, *Repulsion (Legal aspects), *Riddance (Legal aspects), *Damages, Remedies, Percolation, Seepage, Underseepage, Underflow, Subsurface drainage, Soil moisture, Percolating water, Dams, Hydraulic structures, Mineral industry, Industrial water, Impounded waters, Ponds, Surface waters, Reservoirs, Flooding, Judicial decisions, Legal aspects, Easements, Prescriptive rights, Rainfall, Sands, Natural flow.
Identifiers: Statute of limitations.

Plaintiff brought this action against the owner of adjacent servient property for damages resulting from defendant's blockage of the natural flow of surface waters from plaintiff's land and for damages resulting from impoundment of water on defendant's land. Defendant built a dam on lands adjoining plaintiff's land. The dam prevented the natural flow of water from plaintiff's land and caused the saturation of the moulding sand located on plaintiff's property. The court held that the claim arising from blockage of the surface water flow was barred by the statute of limitations but held the allegations concerning impoundment of waters on defendant's property by construction of a dam constituted a cause of action for private nuisance. The court noted that the evidence disclosed that the nuisance arose from the maintenance of the dam, not its construction, and that, under Alabama law, damages for nuisance predicated on negligent maintenance are awarded as though the nuisance were abatable. The court therefore awarded damages only for the temporary injury caused plaintiff and not for any prospective damages. (Katz-Fla)
W69-07248

BURLEYSON V WESTERN AND ATLANTIC RR (OVERFLOW AS AN ABATABLE NUISANCE).

91 Ga App 745, 87 SE 2d 166-171 (1955).

Descriptors: *Georgia, *Overflow, *Culverts, *Remedies, Rainfall, Rainfall-runoff relationships, Damages, Judicial decisions, Flooding, Ditches, Depreciation, Railroads, Legal aspects.
Identifiers: *Nuisance (Abatable).

Plaintiff sought recovery for damage to his land allegedly caused by an inadequate drainage culvert maintained by defendant railroad. In times of heavy rain the culvert overflowed causing erosion on the land and thus depreciated the rental value of the land. The appellate court sustained the trial court's finding that plaintiff was not entitled to recovery for permanent damages, since the overflow constituted an abatable nuisance and plaintiff could not assume that the condition would continue indefinitely. The proper remedy should have been to bring from time to time separate suits for recurring injury. The measure of damages for continuing abatable nuisance is diminution of rental value during existence of the nuisance and not diminution in market value of the property. (Kahle-Fla)
W69-07249

GOUGH V GOBLE (OBSTRUCTION TO FLOW OF SURFACE WATER).

2 Ill 2d 577, 119 NE 2d 252-254 (1954).

Descriptors: *Illinois, *Obstruction to flow, *Surface waters, *Surface drainage, Floodwater, Surface runoff, Drainage water, Channels, Canals, Gullies, Judicial decisions, Water law, Legal aspects, Alteration of flow, Relative rights, Culverts, Barriers, Natural flow.

Plaintiff was awarded a mandatory injunction to compel defendants to remove an obstruction from their land which allegedly impeded the natural flow of water from plaintiff's land. When for more than forty years surface waters from an upper landowner's realty had passed through a culvert and flowed onto the lower landowner's land at a level two feet lower than the general surrounding ground, the lower landowner had no right to obstruct the culvert and to impede the flow of water, even though the landowner was merely restoring to its natural level land which had been lowered over the course of years by action of water from the culvert. (Dean-Fla)
W69-07251

STATE V GEORGE C STAFFORD AND SONS (BOUNDARY DISPUTE OVER FILLED IN LAKE SHORE).
105 A 2d 569-575 (N H 1954).

Descriptors: *New Hampshire, *Boundary disputes, *Land tenure, *Littoral, Riparian rights, Lakes, Great ponds, Equitable apportionment, Shores, Judicial decisions, Landfills, Land forming, Highway effects, High water mark, Legal aspects, Reasonable use, Legislation, Administrative agencies, Ownership of beds, State governments.
Identifiers: Estoppel.

While constructing a highway, the state extended the shoreline of a lake by filling in part of the bed. The fill was placed, with defendant's permission, adjacent to the shore bordering defendant's land. After the highway commissioner agreed that defendant would receive title to the filled land, defendant made improvements and added a wharf, all of which brought public complaints. The state filed this bill in equity to determine the boundary line between the state's and defendant's lands, and to remove the cloud from the state's title. The appellate court held defendant had no title since the commission lacked authority to grant it, and that the state, by statute, could not lose rights through estoppel. The court ruled a littoral owner may acquire land by filling in the shore only through legislative sanction, since beds of great ponds and lakes are held in trust by the state for the public. Furthermore, the court held the right to build wharves must be exercised reasonably so as to protect public interests, and allowed the lower court alternative to an equitable solution. (Wheeler-Fla)
W69-07252

STUART V LAKE WASHINGTON REALTY CORP (ACTION TO ENJOIN FLOODING OF PROPERTY BY RAISING LAKE LEVEL).

92 SE 2d 891-909 (Sup Ct App W Va 1956).

Descriptors: *West Virginia, *Dams, *Backwater, *Flood damage, Relative rights, High water mark, Design flood, Flooding, Land tenure, Easements, Judicial decisions, Legal aspects, Lakes, Lake shores, Impoundments, Water levels, Contracts.
Identifiers: Injunctions (Mandatory), Injunctions (Prohibitory), Estoppel, Balance of convenience.

Plaintiffs sued to enjoin defendant realty corporation from further flooding their lakefront property and to compel defendant to remove impounded waters. Plaintiffs contended the inundation resulted when defendant raised the lake's elevation by increasing the height of defendant's dam. The man-made lake was part of defendant's housing development, from which plaintiffs' land had been withheld. Defendant urged the use of the balancing of convenience doctrine, since lowering the lake level would reduce the value of the development, and would cause breaches of contract already made with lot purchasers. Defendant alternately claimed an implied easement to flood plaintiffs' land. The appellate court found that an implied easement must have been within the intention of the parties when conveyance was made, and that it must have been mentioned in the deed, or have been apparent, continuous, and necessary for the enjoyment of the land retained. In the instant case, no easement was mentioned in the deed nor was apparent in fact. The court further found that relative inconvenience to each party would not be balanced where the non-wrongdoing party would suffer substantial and irreparable injury, even though the wrongdoer will suffer greater injury. (Kelly-Fla)
W69-07260

4C. Effects on Water of Man's Non-Water Activities

LAIRD, ROCK AND SMALL, INC V HARRY T CAMPBELL AND SONS (FLOODING DUE TO NEGLIGENT ROAD CONSTRUCTION).
For primary bibliographic entry see Field 06E.
W69-07021

VENTURA V CITY OF PITTSBURGH (ACCIDENT CAUSED BY ICE FORMING ON A HIGHWAY).
For primary bibliographic entry see Field 06E.
W69-07022

STRICKLAND V STATE (HIGHWAY CONSTRUCTION AND SURFACE WATER DRAINAGE).
For primary bibliographic entry see Field 06E.
W69-07042

CITIZENS COMM FOR HUDSON VALLEY V VOLPE (WAIVER OF THE DEFENSE OF SOVEREIGN IMMUNITY).

297 F Supp 809-814 (S D N Y 1969).

Descriptors: *New York, *United States, *State governments, *Hudson River, Streams, Surface waters, Highways, Roadbanks, Road construction, Landfills, Dams, Bridges, Transportation, Embankments, Scenic highways, Adjudication procedure, Legal aspects, Judicial decisions, Highway effects, Environmental effects, Damages, Remedies, Federal government, Engineering structures.

Plaintiffs brought this action against the state Commissioner of Transportation challenging the construction of the Hudson River Expressway. The defendant obtained permission from the federal government to construct the road. Permission was admittedly required since the proposed expressway would extend into and over the River. The plaintiffs' contended that the defendant had waived the defense of sovereign immunity in federal court by knowingly entering an area regulated by Congress pursuant to constitutional authority. The court held that this limitation on the defense of sovereign immunity only applied where a state had entered a sphere of operation subject to causes of action created by Congress in favor of a specific class (FELA claims). The plaintiffs in this case did not bring its action under a statute requiring a person to secure a federal permit prior to alteration of a navigable stream. Therefore, the defendant had not waived the defense of sovereign immuntity to an action at law. However, when a state official attempts to proceed under a statute claimed to be unconstitutional, he is stripped of his official character and may be enjoined from proceeding. (Katz-Fla)
W69-07195

CITIZENS COMM FOR THE HUDSON VALLEY V VOLPE (PRELIM INJUNCTION BARRING HIGHWAY CONSTRUCTION ALONG A NAVIGABLE STREAM).
297 F Supp 804-808 (S D N Y 1969).

Descriptors: *New York, *United States, *State governments, *Highways, Hudson River, Streams, Surface waters, Roadbanks, Road construction, Landfill, Dams, Bridges, Transportation, Embankments, Scenic highways, Adjudication procedure, Legal aspects, Judicial decisions, Highway effects, Environmental effects, Damages, Remedies, Federal government, Engineering structures.
Identifiers: Prereq for prelim injunction.

Plaintiffs applied for a preliminary injunction prohibiting the delivery of a permit authorizing the State of New York to begin landfill operations on the proposed Hudson River Expressway. The court held that the plaintiff had failed to demonstrate a reasonable probability of success at trial challenging the construction of the expressway. The court noted that the items of damage claimed by the plaintiff were highly conjectural and that adequate remedy at law existed. Further delay in commencement of construction would increase the project's cost. Therefore, the court denied the plaintiff's application. The plaintiff had contended that the expressway project was incorrectly treated by the Army and Interior departments as one requiring a mere permit. The plaintiffs argued that the project called for construction of dikes and causeways and therefore required consent of Congress. The court noted that the project would not substantially interfere with navigation and determined that plaintiffs' argument in this regard would be of no avail. (Katz-Fla)
W69-07196

IN RE APPROPRIATION OF EASEMENTS FOR HIGHWAY PURPOSES (COMPENSATION FOR DAMAGES CAUSED BY TAKING UNDER EMINENT DOMAIN).

163 NE 2d 181-186 (Ohio Ct App 1958).

Descriptors: *Ohio, *Eminent domain, *Subsurface waters, *Damages, Compensation, Easements, Springs, Underground streams, State governments, Administrative agencies, Groundwater movement, Highways, Road construction, Legal aspects, Judicial decisions, Condemnation.
Identifiers: *Underground reservoirs, *Adjacent landowners.

The Director of Highways instituted proceedings to acquire an easement through a tract of land on which several completed houses of a project were located. It appeared from the evidence that the excavation would release the water from a natural underground reservoir and cut off the only source of water available to the houses in the project. The court of appeals in affirming a judgment in the trial court appealed from by the Director held the governmental right of eminent domain was not analogous to that of an adjacent landowner, who can legally drill for water even at the risk of impairing his neighbor's supply. The requirement to compensate for a taking under eminent domain is absolute, regardless of forseeability. If the state is called upon to pay high damages, it may choose not to take. The court held compensation must extend to damage to adjacent property as well as that under the easement. The court further held evidence of rents paid on completed houses to be admissible as an element of fair market value. Finally, the court felt the resolutions and findings of the Director of Highways was admissible in evidence to help establish compensation. (Harris-Fla)
W69-07212

PERSIN V CITY OF YOUNGSTOWN (FLOODING OF LOWER TRACT DUE TO AIRPORT CONSTRUCTION).

92 NE 2d 237-244 (Ct App Ohio 1949).

Descriptors: *Ohio, *Surface waters, *Surface drainage, *Obstructions to flow, Floodwater, Surface runoff, Flooding, Drainage water, Drainage, Floods, Water law, Judicial decisions, Legal aspects, Snowmelt, Airports, Flow augmentation, Diversion, Alteration of flow, Reasonable use, Natural flow, Rainfall-runoff relationships, Relative rights, Cities, Construction.

Plaintiff brought action against defendant city for damages resulting from defendant's construction of an airport which allegedly diverted surface water from its natural course, accelerating and increasing the flow and causing flooding of plaintiff's land. A lower tenement is burdened with a servitude to receive all surface water accumulating from falling rain, melting snow or from natural springs that naturally flow from higher land onto the lower tract. The construction of an airport by the defendant city amounted to rightful and reasonable use of its land, and there was no evidence which demonstrated a direct causal connection between the construction of the airport and the flooding of plaintiff's land. The judgment for defendant was affirmed. (Dean-Fla)
W69-07250

FLANAGAN V GREGORY AND POOLE INC (UPSTREAM RIGHTS IN RE FLOW).
67 SE 2d 865-874 (W Va 1951).

Descriptors: *West Virginia, *Roadbanks, *Repulsion (Legal aspects), *Culverts, Streams, Riddance (Legal aspects), Real property, Natural flow, Obstruction to flow, Downstream, Coal mines, Strip mines, Judicial decisions, Legal aspects, Hydraulic structures, Dams.

Plaintiff sued the defendant corporation and the corporation's lessor for damage to plaintiff's land and buildings caused by flooding. The damage was caused by defendant corporation's erection and maintenance of an embankment for a roadway across the valley of a creek below plaintiff's land and an inadequate drainage culvert under such a roadway. The court, in passing on the propriety of the lessor's joinder, held that a landowner who permits a lessee to erect such a roadway and an inadequate culvert in a manner which impedes the flow of a stream is liable as a codefendant if the lessor acted in concert with the lessee. The court determined that the lessor leased the property to the lessee for the purposes of strip mining coal in pursuit of a common interest and upheld the joinder. (Katz-Fla)
W69-07254

COUSIN V HORNSBY (LANDOWNER IS RESTRICTED TO ACTION FOR DAMAGES ONCE RIGHT TO RESIST EXPROPRIATION IS WAIVED).
87 So 2d 157-163 (Ct App La 1956).

Descriptors: *Louisiana, *Appropriation, *Right-of-way, *Channel improvement, Judicial decisions, Preferences (Water rights), Priorities, Eminent domain, Damages, Value, Condemnation value, Land appraisal, Local governments, Contracts, Legal aspects.

Plaintiff sued defendant contractor for trespass and related damages to his land, trees, and flowing springs resulting from a contractor's dredging. The contractor was under contract to a subdivision of the State Public Works Dept to construct a drainage project. The state was to obtain rights-of-way prior to entry upon the land by the contractor. No right-of-way was ever obtained over the plaintiff's land, but information of this was not conveyed personally to the contractor, who entered upon the land and began work. The state authorities claimed that the contractor was liable for all damage caused by his own acts or omissions. The state claimed that the defendant had been notified of the lack of appropriation through one of his own agents. This court amended and affirmed a decision for the plaintiff. The state should reimburse the defendant for any judgments already paid to the plaintiff since it was the state which contracted for the work the contractor faithfully performed. The plaintiff knew his land was to be taken as part of the project yet did not sue until work was completed. By acquiescing in the taking of his land, and by not seeking injunctive relief before the damage was done, the plaintiff is now able to bring merely an action to recover the value of the land taken and damages to adjacent property. Blunt-Fla)
W69-07255

ORTEGO V CALDWELL (ACTION FOR DAMAGES DUE TO CROP FLOODING RESULTING FROM DEFECTIVE LEVEE).
87 So 2d 124-127 (La 1956).

Descriptors: *Louisiana, *Levees, *Earthworks, *Highway relocation, Judicial decisions, Damages, Flooding, Flood protection, Flood damage, Cost repayment, Standards, Road construction, Legal aspects, Contracts, Projects, Rain water, Surface runoff.
Identifiers: Agency, Independent contractors.

Plaintiffs brought this action for damages against defendant contractor alleging that defendant had improperly constructed a levee designed to prevent flooding of plaintiffs' land and crops via drainage from an adjoining highway. Plaintiff had permitted the state department of highways to destroy an old levee on plaintiffs' land in order to widen an adjoining highway. In return, the department had promised construction of a new levee to be built to the plaintiffs' satisfaction. Defendant contractor improperly constructed the levee so that several breaks occurred during heavy rains, resulting in crop damage to plaintiffs. The court permitted plaintiffs to sue defendant, as an independent contractor of the state, on the contract clause guaranteeing satisfaction. The court permitted a finding of liability in spite of the agency relationship with the state, holding that the state had not actually approved defendant's work. (Kelly-Fla)
W69-07262

GINTHER V LONG (ACTION FOR DAMAGES DUE TO TEMPORARY POLLUTION OF SOIL, RESULTING IN TIMBER LOSS).

87 So 2d 286-289 (Miss 1956).

Descriptors: *Mississippi, *Soil contamination, *Oil wastes, *Property values, Effluents, Compensation, Damages, Depreciation, Timber, Fouling, Judicial decisions, Legal aspects, Water pollution, Oil wells, Waste water (Pollution).

Appellee landowner brought suit for damages to his land and timber, alleging this resulted because appellant permitted deleterious effluents to flow on appellee's land from appellant's oil well, which operated on adjacent land. The state Supreme Court upheld appellee's claim, finding that salt water and oil from appellant's oil well operation caused injury to appellee's land and timber. The court held that appellant's certificate of compliance to the pollution regulations of the Fish and Game Commission was inadmissible as evidence of nonpollution, since it was issued after appellee's claim had matured. The court found, however, that appellee had been awarded excessive damages, because the pollution had caused temporary rather than permanent injury. The measure of damages in Mississippi for temporary injury is the depreciation in rental value of the property, not the depreciation in its market value. (Kelly-Fla)
W69-07263

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

DETERMINATION OF NITRATE IN ESTUARINE WATERS--COMPARISON OF A HYDRAZINE REDUCTION AND A BRUCINE PROCEDURE AND MODIFICATION OF A BRUCINE PROCEDURE,
Federal Water Pollution Control Administration, Metuchen, N. J. Hudson-Champlain and Metropotitan Coastal Comprehensive Water Pollution Control Project.
For primary bibliographic entry see Field 02L.
W69-06861

PROVISIONAL ALGAL ASSAY PROCEDURE,
Joint Industry-Government Task Force on Eutrophication, New York.
G. P. Fitzgerald, Joseph Shapiro, C. R. Goldman, O. R. Armstrong, and Jack Myers.
Published by Joint Industry/Government Task Force on Eutrophication, P O Box 3011, Grand Central Station, New York, 62 pp, Feb 1969. 7 fig, 5 tab, 26 ref.

Descriptors: *Algae, *Bioassay, Nutrients, Eutrophication, Water pollution effects, Water pollution sources, Bioindicators, Nitrogen fixation.
Identifiers: *Algal growth, Nutrient availability, Algal growth potential, Selenastrum capricornutum, Anabaena flos-aquae, Microcystis aeruginosa, Algal cultures, Chemostats, Carbon-14.

The procedure described was developed by a team of international experts under the sponsorship of the Joint Industry/Government Task Force on Eutrophication and represents the first step toward developing reliable and reproducible tests to determine the capacity of various aquatic environments to grow algae. It is emphasized that the procedures presented are provisional and are not standardized tests. Three procedures are described: a bottle test, a continuous-flow chemostat test, and an in situ test. Detailed descriptions of equipment required, laboratory procedures, analytical techniques, and sample preparation are given. Indicator organisms selected for use in the tests are Selenastrum capricornutum, a green alga; Anabaena flos-aquae, a blue-green alga capable of fixing nitrogen; and Microcystis aeruginosa, a blue-green alga not capable of fixing nitrogen. (Uttormark-Wis)
W69-06864

MICROORGANIC MATTER IN WATER,
Carnegic-Mellon Univ., Pittsburgh, Pa.
R. A. Baker.
ASTM STP No 448, Symp on Microorganic Matter in Water, Amer Soc Testing Mater 71st Annu Meeting, June 23-28, 1968, San Francisco, Feb 1969. 124 p, 43 fig, 27 tab, 205 ref.

Descriptors: *Organic matter, *Microorganism, *Water chemistry, Analytical techniques, Pesticides, Phenols, Chromatography, Fluormetry, Trace elements.
Identifiers: *Symposia.

A symposium was held to discuss organic contaminants in water, with emphasis on microorganisms, pesticides, and analytical techniques. Topics of papers include nitrogen uptake, pesticide analysis, freeze concentration of microorganics for analysis, thin-layer chromatography to identify phenols, fluorescence techniques, and determination of trace amounts of molybdenum. (Knapp - USGS)
W69-06968

MICROBES AND MICROORGANICS IN WATER - A REVIEW,
Koppers Co., Inc., Monroeville, Pa. Dept. of Research.
For primary bibliographic entry see Field 05G.
W69-06969

ANALYSIS FOR ORGANIC PESTICIDES IN AQUATIC ENVIRONMENTS,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Environmental Sciences; Rutgers - The State Univ., New Brunswick, N. J. Bureau of Conservation; and Drexel Inst. of Tech., Philadelphia, Pa.
S. D. Faust, and I. H. Suffet.
Res supported by grant from USPHS. ASTM STP No. 448, Symp on Microorganic Matter in Water, Amer Soc Testing Mater 71st Annu Meeting, June 23-28, 1968, San Francisco, pp 24-64, Feb 1969. 41 p, 7 fig, 18 tab, 87 ref. Grant No. ES-00016 PHS.

Descriptors: *Chemical analysis, *Pesticides, *Analytical techniques, Chromatography, Gas chromatography, Aromatic compounds, Organic compounds, Organophosphorus pesticides, Photometry.
Identifiers: Pesticide analysis.

The detection of organic pesticides in aquatic environments is unique in that specificity is required under extremely sensitive conditions as opposed to gross analysis for trace organics in water. First, there is the problem of pesticide identification. Second, direct measurement is not feasible because of sensitivity and specificity requirements. Extraction, concentration, and cleanup techniques must be employed prior to qualitative analysis and quantification. Third, natural waters may contain such organic interferences as aromatic and aliphatic compounds from industrial waste waters, and naturally occurring colored compounds. These impurities are often present in concentrations greater than the pesticide. A brief critique of extraction, cleanup, identification, and quantification techniques is given to emphasize limitations, fallacies, and pitfalls. A model system is outlined for the recovery, separation, and confirmation of organophosphate pesticides, oxons, and their hydrolysis products. This model system provides by liquid-liquid extraction, separation by gas-liquid chromatography, and subsequent confirmation by micro-ultraviolet absorption spectrophotometry are discussed. (For main entry see W69-06968.)
W69-06971

DETERMINATION OF PHENOLS IN SURFACE WATERS BY THIN-LAYER CHROMATOGRAPHY,
Federal Water Pollution Control Administration, Cincinnati, Ohio. Analytical Quality Control Branch.
Doris Smith, and J. J. Lichtenberg.
ASTM STP No 448, Symp on Microorganic Matter in Water, Aner Soc Testing Mater 71st Annu Meeting, June 23-28, 1968, San Francisco, pp 78-95, Feb 1969. 18 p, 9 fig, 5 tab, 29 ref, 1 append.

Descriptors: *Analytical techniques, *Phenols, *Chemical analysis, *Chromatography, Water pollution, Pollutants, Pollutant identification, Surface waters.
Identifiers: *Thin-layer chromatography.

Thin-layer chromatographic procedures for the determination of phenol and certain substituted phenols are applied to raw surface waters. Both water grab and carbon adsorption samples are analyzed. The concentrated solvent extracts of the samples are chromatographed on silica gel G thin layers and developed in benzene/cyclohexane/diethylamine (5:4:1) or chloroform. The first system provides for selective determination of the alkylphenols, since the chloro-, nitro- and aminophenols remain at or near the origin. Phenols developed with this system are detected with p-nitrobenzendiazonium, fluoroborate. Those developed with chloroform are detected with Gibbs' reagent. Specific phenols are characterized by their Rf values and the color of the spots produced. A wide variety of phenols are detected at the 0.1 to 10 microgram level with the Gibbs' reagent and at the 0.5 microgram level with p-nitrobenzenediazonium fluoroborate. (For main entry see W69-06968.)
W69-06972

FLUORESCENCE TECHNIQUES IN DETECTION OF ORGANICS IN WATER,
Washington Univ., Seattle. Dept. of Chemistry; and Washington State Water Pollution Control Commission.
R. F. Christman, and J. L. Arnquist.
ASTM STP No 448, Symp on Microorganic Matter in Water, Amer Soc Testing Mater 71st Annu Meeting, June 23-28, 1968, San Francisco, pp 96-115, Feb 1969. 20 p, 14 fig, 1 tab, 14 ref.

Descriptors: *Analytical techniques, *Chemical analysis, *Organic matter, *Aqueous solutions, *Fluorometry, Fluorescence, Color, Water quality, Water pollution effects.
Identifiers: Water color, Flavonoids.

The fundamental objective of the authors' continuing research in this area is to increase our understanding of the chemical structures of natural product organic molecules responsible for color in natural water and the mechanism of their interaction with salts of trivalent Al and trivalent Fe. Previous research has resulted in the isolation and identification of seven aromatic oxidation products of the parent color producing macromolecules. In this paper the research results of interaction studies using model flavonoid compounds and controlled concentrations of coagulant metal ions, alkalinity, and ionic strength are presented. (For main entry see W69-06968.)
W69-06973

DETERMINATION OF TRACE AMOUNTS OF MOLYBDENUM,
California Univ., Davis. Inst. of Ecology.
Richard Armstrong, and C. R. Goldman.
ASTM STP No 448, Symp on Microorganic Matter in Water, Amer Soc Testing Mater 71st Annu Meeting, June 23-28, 1968, San Francisco, pp 116-124, Feb 1969. 9 p, 16 ref. NSF Grant GB6422X USPHS WP 01188-01.

Descriptors: *Analytical techniques, *Chemical analysis, *Molybdenum, *Nutrients, Trace elements, Chemical precipitation, Organic compounds, Spectrophotometry.
Identifiers: Micronutrients, Trace metals, Coprecipitation.

Molybdenum is determined directly in solutions containing above 100 ppb. A spectrophotometric method using the extractable complex with diacetyldithiol was found to be the most convenient and the least subject to interference of a number of methods. Preconcentration of dissolved molybdenum by coprecipitation with hydrated manganese dioxide followed by spectrophotometry of the dithiol complex allows the determination of 1 microgram of molybdenum in a 5-liter sample (o.2ppb) with a relative error of 3%. Particulate matter may be removed from water samples by HA Millipore filtration or by continuous flow (150 ml/min) centrifugation at 28,000 g. The latter method is more convenient for processing the large (10L to 50L) water samples needed for estimating the trace metal content of suspended particles in unpolluted waters. Molybdenum is most conveniently released from organic materials by wet oxidation with perchloric acid, the residue being taken up in 3-N hydrochloric acid. Hydrofluoric acid digests of silicate samples were found to give higher recoveries than perchloric acid digests and were found to be more reproducible than fusion methods. (For main entry see W69-06968.)
W69-06974

IMPORTANCE OF THE BOD PLATEAU,
California Univ., Davis.
For primary bibliographic entry see Field 05B.
W69-06980

DETERMINATION OF DISSOLVED HYDROCARBONS IN SUBSURFACE BRINES,
Chevron Research Company, La Habra, Calif.
Clayton McAuliffe.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 225-233, Mar 1969. 9 p, 4 fig, 3 tab, 11 ref.

Descriptors: *Water chemistry, *Analytical techniques, *Chemical analysis, *Organic compounds, Brines, Saline water systems, Saline water, Solutes, Ions, Alcohols, Aromatic compounds, Chromatography, Solubility, Gas chromatography.
Identifiers: *Hydrocarbons.

Hydrocarbons dissolved in subsurface waters can be determined by several analytical procedures. The method selected should depend upon the hydrocarbons of interest and the sensitivity required. These methods provide techniques that can be used as an aid in petroleum exploration, and provide information to help answer questions concerning petroleum origin, migration, and accumulation. Proper percautions must be taken to minimize hydrocarbon loss during sample collection, storage, and analysis. The solubility of hydrocarbons in water varies as much as 5-6 orders of magnitude, depending upon the hydrocarbon type and molecular weight within a homologous series. The concentration of dissolved hydrocarbons in subsurface brines varies widely from brine to brine. Marked variations also occur in the relative concentrations of the individual hydrocarbons dissolved.
W69-07101

AERIAL PHOTOGRAPHIC TECHNIQUES IN POLLUTION DETECTION,
Wisconsin Univ., Madison. Dept. of Civil Engineering; and Itek Corp., Lexington, Mass. Photogrammetry Dept.
James P. Scherz, William C. Boyle, and Donald R. Graff.
See also W69-07110. Proc of 23rd Ind Waste Conf, May 7-9, 1968, Purdue Univ, Part 1, pp 87-100, 1969. 14 p, 17 fig, 26 ref.

Descriptors: *Aerial photography, *Water pollution control, *Remote sensing, Spectrophotometry, Infrared radiation, Photogrammetry, Photometry, Tracking techniques, Pollutant identification.
Identifiers: Infrared photography, Pollution photography.

Aerial photography may be used to identify various pollutants and to estimate dissolved oxygen and algal growth. Reflection characteristics of wastes are studied by spectrophotometry and shown graphically. Secondary effects, such as foaming where heated wastes enter bodies of water, are shown better by proper film-filter combinations than seen by the eye. (Knapp-USGS)
W69-07111

5B. Sources of Pollution

A CHEMICAL INDEX OF SOIL NITROGEN AVAILABILITY,
Iowa State Univ., Ames. Dept. of Agronomy.
D. R. Keeney, and J. M. Bremner.
Nature, Vol 211, No 5051, pp 892-893, Aug 1966. 1 tab, 6 ref.

Descriptors: *Cycling nutrients, Chemical analysis, Eutrophication, Water pollution sources, Soils, Sediments, Nitrogen compounds.
Identifiers: *Soil nitrogen availability, Steam distillation procedure, Kjeldahl procedures.

A chemical method of obtaining an index of soil nitrogen availability is described and compared

with three other chemical methods and two biological procedures. The proposed procedure involves extraction of 5 grams of soil with 30 milliliters of boiling water and determination of the extracted nitrogen by a steam distillation procedure. The procedure correlated well with the two incubation procedures and provided a rapid, reliable determination of soil nitrogen availability. (Konrad-Wis)
W69-06860

NUTRIENT REGENERATION AND PREFORMED NUTRIENTS OFF OREGON,
For primary bibliographic entry see Field 02K.
W69-06862

POLLUTION AND OBSTRUCTION OF WATERS.
For primary bibliographic entry see Field 06E.
W69-06887

MADISON METROPOLITAN SEWERAGE DIST V COMM ON WATER POLLUTION (DISCHARGE OF SEWAGE INTO LAKE WATER).
For primary bibliographic entry see Field 06E.
W69-06909

ENDRIN IN WATER FROM TREATED DOUGLAS FIR SEED,
Federal Water Pollution Control Administration, Corvallis, Oreg. Pacific Northwest Water Lab.
Richard B. Marston, Robert M. Tyo, and Stephen C. Middendorff.
Pesticides Monit J, Vol 2, No 4, pp 167-171, Mar 1969. 5 p, 4 fig, 2 tab, 2 ref.

Descriptors: *Pesticides, *Pesticide kinetics, *Water pollution sources, *Endrin, *Oregon, Pesticide drift, Pesticide residues, Water chemistry, Leaching, Translocation, Path of pollutants, Streamflow.
Identifiers: Alsea River (Oreg), Seed treatment residues.

Reseeding a 175-acre 'clear-cut' watershed in the headwaters of the Alsea River near Salado, Oreg., on January 23, 1967, followed the conventional practice of aerially broadcasting endrin-coated Douglas fir seed. Measurable amounts of endrin were detected in the streamflow for 2 hours after seeding started and again during the high flow of a winter freshet that occurred the sixth day after seeding. The total amount of endrin found in these two periods of runoff amounted to only 0.006 lb per square mile, or 0.12% of the endrin used to treat the seed. This was much lower than the results obtained in the laboratory (11.3%) from soaking endrin-treated seed in distilled water for 32 days.
W69-06947

DISTRIBUTION OF DIELDRIN AND DDT CRANBERRY BOG SOIL,
Massachusetts Univ., East Wareham. Cranberry Experiment Station.
K. H. Deubert and B. M. Zuckerman.
Pesticides Monit J, Vol 2, No 4, pp 172-175, Mar 1969. 4 p, 1 fig, 2 tab, 6 ref. Water Resources Grant WR-10.

Descriptors: *Pesticide residues, *Bogs, *DDT, *Dieldrin, *Path of pollutants, *Pesticide kinetics, Leaching, Translocation, Streamflow, Cranberries, Soil contamination, Water pollution sources, Adsorption, Organic matter, Soils.
Identifiers: Cranberry bogs.

Relatively large amounts of dieldrin, averaging 1.18 ppm and large amounts of DDT residues, averaging 3.57 ppm, 13 years after the last application were found in the top 2 inches of cranberry bog soil. Horizontal movement of the residues is favored by the movement of floodwater. In view of the possibility that dieldrin residues in cranberry bogs may contribute to water pollution, a leaching experiment was carried out. Chromatographic columns were filled with washed Standard Sand 20-30 until a 1-inch layer was obtained. A 2-inch layer of 2-mm air dry bog soil containing 2.3 ppm dieldrin was added and covered with 1 inch of sand. Distilled water was added at a rate of 2 ml/min, and the first 250 ml of eluate was analyzed for dieldrin. The eluate was not analyzed for organic colloids as carriers of dieldrin, although there are indication that dieldrin is bound to organic colloids by physical forces. The 250 ml of water removed 0.19 of the 42.5 micrograms of dieldrin contained in the bog soil. Under natural conditions water that is drawn off a bog has come in contact with the soil surface only. On the bog the residues may move with the floodwater, as the distribution of DDT in Bog 1 and the dieldrin residues in the irrigation ditches of Bog 2 indicate. Sprinkler irrigation instead of flooding appears to be a promising measure to keep the horizontal movement of these and probably other residues at a minimum.
W69-06948

INTERACTION OF PESTICIDES WITH NATURAL ORGANIC MATERIAL,
Geological Survey, Denver, Colo.
R. L. Wershaw, P. J. Burcar, and M. C. Goldberg.
Environ Sci and Technol, Vol 3, No 3, pp 271-273, Mar 1969. 3 p, 3 fig, 1 tab, 9 ref.

Descriptors: *Pesticide kinetics, *Sorption, *Solubility, *Humic acids, DDT, 2, 4, 5-T, Leaching, Persistence, Pesticide residues, Soil, Soil chemical properties.
Identifiers: Pesticide solubilization.

Sodium humate solubilizes DDT and humic acid strongly sorbs 2, 4, 5-T. The solubility of DDT in 0.5% sodium humate solution is at least 20 times its solubility in pure water. Solutions of 2,4,5-T of .0000121 g/ml and 0.1 N NaCl were mixed with humic acid. Adsorption data are shown graphically. Ion exchange may play a part in this sorption. (Knapp-USGS)
W69-06949

MICROORGANIC MATTER IN WATER,
Carnegic-Mellon Univ., Pittsburgh, Pa.
For primary bibliographic entry see Field 05A.
W69-06968

UPTAKE AND ASSIMILATION OF NITROGEN IN MICROECOLOGICAL SYSTEMS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 05C.
W69-06970

GROUND-WATER POLLUTION FROM NATURAL GAS AND OIL PRODUCTION IN NEW YORK,
Geological Survey, Albany, N. Y.
Leslie J. Crain.
N Y State Water Resources Comm Rep of Invest No RI-5, 1969. 15 p, 8 fig, 10 ref.

Descriptors: *Water pollution, *Oil fields, *Groundwater, *New York, Oil wastes, Oily water, Saline water, Water wells, Aquifers.
Identifiers: Groundwater pollution (N Y).

Natural gas is produced throughout the central and western part of New York, whereas oil production has been limited mainly to Alleghany and Cattaraugus Counties. Ground-water pollution resulting from leakage of natural gas wells is in the form of salt water or gas. Such pollution is usually very local and is usually difficult to separate from natural contamination. Oil production, particularly the secondary recovery of oil by the water-flooding method, has resulted in the pollution of ground- and surface-water supplies with oil and salt water. Pollution from active oil fields has been caused by separator units that dispose their wastes on the ground, and by leakage and spillage from wells. Pollution in abandoned fields is usually caused by the upward movement of oil and salt water, under artesian pressure, through uncapped or leaking wells. The problems of oil pollution are expected to increase in the future as other areas in the oil fields become populated or are developed for sources of water supply. Pollution from abandoned fields especially is expected to increase. (USGS)
W69-06975

A SPECIAL CASE, THERMAL DIGITAL SIMULATION OF WASTE HEAT DISCHARGES,
Battelle Memorial Inst., Richland, Wash.; and Computer Sciences Corp., Richland, Wash.
For primary bibliographic entry see Field 05C.
W69-06979

IMPORTANCE OF THE BOD PLATEAU,
California Univ., Davis.
E. D. Schroeder.
Water Res, Vol 2 No 11, pp 803-809, Nov 1968. 7 p, 2 fig, 4 tab, 17 ref.

Descriptors: *Biochemical oxygen demand, *Laboratory tests, Biochemistry, Bacteria, Biodegradation, Sludge digestion, Aquatic microbiology, Dissolved oxygen, Indicators, Organic matter, Oxygen sag.
Identifiers: Substrate removal (Bacterial).

Laboratory experiments show that 5-day BOD, 24-hr BOD, or any other timed determination is not reproducible or significant, but that BOD reaches reproducible plateau values if allowed to react long enough. Oxygen demand is not a function of time in the strict sense, but the plateau value is formed when bacteria remove the substrate, and occurs at any time depending on the number and physiological state of the initial bacteria content. (Knapp-USGS)
W69-06980

OPTIMAL RELEASE SEQUENCES FOR WATER QUALITY CONTROL IN MULTIPLE-RESERVOIR SYSTEMS,
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 05G.
W69-06982

CONTRACTS FOR ABATEMENT OF POLLUTION.
For primary bibliographic entry see Field 06E.
W69-07056

AN ECOLOGICAL STUDY OF THE ALGAE OF THE RIVER MOOSI, HYDERABAD (INDIA) WITH SPECIAL REFERENCE TO WATER POLLUTION - 1. PHYSICO-CHEMICAL COMPLEXES,
Osmania Univ., Hyderabad, (India). Dept. of Botany.
V. Venkateswarlu.
Hydrobiologia, Vol 33, No 1, pp 117-143, Mar 1969. 26 p, 18 fig, 2 tab, 55 ref.

Descriptors: *Ecology, *Algae, *Rivers, *Water pollution, *Water pollution sources, Irrigation, Aquatic algae, Water analysis, Carbonates, Nitrates, Chlorides, Ammonium compounds, Oxygen, Silicates, Organic matter, Air temperature, Aerobic bacteria, Water temperature, Iron.
Identifiers: *India, Moosi River ecological study.

This investigation is concerned with the ecology of the River Moosi, Hyderabad (India) using the data extended over a period of two years with the collection of monthly samples. It deals mainly with the physico-chemical complexes present in the unpolluted and polluted waters of the river. The interrelationships and fluctuations existing between the following factors have been investigated: (1) chloride and water current; (2) nitrate, dissolved oxygen, and free ammonia; (3) nitrate and albuminoid ammonia; (4) free ammonia and albuminoid ammonia; (5) dissolved oxygen, oxidizable organic

matter, and water temperature; and (6) total iron and pH. (Gabriel-USGS)
W69-07096

INDUSTRIAL WASTE CONFERENCE,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 05D.
W69-07110

TRANSPORT OF CHROMIUM-51 IN AN ORGANICALLY POLLUTED ENVIRONMENT,
Tulane Univ., New Orleans, La. Dept. of Civil Engineering; and Texas Univ., Austin. Dept. of Civil Engineering.
Larry W. Canter, and Earnest F. Gloyna.
See also W69-07110. Proc 23rd Ind Waste Conf, May 7-9, 1968, Purdue Univ, Part 1, pp 374-387, 1969. 14 p, 9 fig, 3 tab, 11 ref. AT (11-1)-490.

Descriptors: *Path of pollutants, *Radioisotopes, *Chromium, Oxidation, Reduction, Organic matter, Water pollution, Oxidation-reduction potential, Water chemistry.
Identifiers: Chromium radioisotopes.

Laboratory flume studies of the transport of Cr-51 in streams with organic pollution showed that Cr in non-polluted river tends to exist in the hexavalent state regardless of its initial oxidation state. These findings support the observed predominance of Cr in the hexavalent oxidation state throughout the 240-mile length of the Columbia River below the Hanford reactors. Cr in organically-polluted river systems tends to exist in the trivalent state regardless of its initial oxidation state.
W69-07115

STUDIES ON IN-STREAM AERATION,
Tufts Univ., Medford, Mass.; and National Council of Paper Industries for Air and Stream Improvement, Inc.
For primary bibliographic entry see Field 05G.
W69-07119

FOAM SEPARATION BEHAVIOR OF AQUEOUS SUSPENSIONS OF CLAYS AND/OR IRON,
Marquette Univ., Milwaukee, Wis. Dept. of Civil Engineering; and Kentucky Univ., Lexington. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05D.
W69-07125

LEACHING OF FERTILIZER IONS IN SOIL COLUMNS,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nutrition.
L. A. G. Aylmore, and Mesbahul Karim.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 143-153, 1968. 11 p, 6 fig, 17 ref.

Descriptors: *Soil water movement, *Leaching, *Fertilizers, *Ion transport, *Ion exchange, Diffusion, Dispersion, Solutes, Nutrients, Chlorides, Clays, Sulfates, Lysimeters, Phosphates.
Identifiers: Fertilizer leaching.

The movement of non-reactive and of reactive ions through columns containing artificial soils has been studied and the results compared with the distributions predicted by the chromatographic theories of Day, Lapidus and Amundson, Glueckauf, and Hiester and Vermeulen for the particular conditions of the experiments. Evidence has been obtained that the spreading of a solution-solvent boundary through longitudinal molecular diffusion is only of significance at flow rates of the order of 1 cm/hr or less. The holdback of non-adsorbed ions by diffusion into intra-aggregate pores at slow flow velocities has been illustrated. Comparatively good agreement between experimental and theoretical distributions was obtained under these controlled conditions for both non-reactive and reactive species. The results, however, illustrate the dependence of the progressive adsortion-desorption process by which the movement of a particular ionic species occurs on the presence of other ions, pH value and the complicities of soil constitution. These factors make a generalized theoretical approach to the movement of ions in solution through soils extremely difficult.
W69-07137

TRANSPORT OF ATRAZINE IN A LATOSOLIC SOIL IN RELATION TO ADSORPTION, DEGRADATION, AND SOIL WATER VARIABLES,
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
R. E. Green, V. K. Yamane, and S. R. Obien.
Trans of 9th Int Congr of Soil Sci, Adelaide, Australia, Vol 1 of 4 vol, pp 195-204, 1968. 10 p, 3 fig, 7 ref.

Descriptors: *Pesticide kinetics, *Diffusion, *Path of pollutants, *Soil water movement, Adsorption, Hydrolysis, Biodegradation, Leaching, Chromatography, Dispersion, Permeameters, Hydraulic models, Mathematical models.
Identifiers: Pesticide transport, Latosols, Atrazine.

Atrazine transport in a latosolic soil was measured in the laboratory under saturated and unsaturated conditions. Effluent peaks for unsaturated columns were higher and arrived somewhat later than under saturated conditions. Atrazine elution from saturated columns was found to be nearly the same at flow velocities of 0.6, 3.5, and 7.0 cm/hour. A simple chromatographic model assuming a constant distribution coefficient, instantaneous and reversible adsorption, and laminar fluid flow was used to examine the extent to which adsorption alone would explain the transport of adsorbed molecules. The experimental elution curve arrived earlier and had much greater spread than predicted by the model. Important factors which were not accounted for by the model are variation in microscopic flow velocities and non-linearity of the adsorption isotherm. Chemical hydrolysis of atrazine and the higher adsorption of hydroxy-atrazine at some concentrations suggest that degradation is an important factor affecting atrazine mobility in the field. In conclusion, atrazine transport was closely related to the cumulative infiltration with little sensitivity to flow rate or prevailing water content. A chromatographic approach to the study of pesticide transport appears promising, but consideration must be given to both adsorption and dispersion factors.
W69-07139

5C. Effects of Pollution

THE REMOVAL OF DISSOLVED PHOSPHATE FROM LAKE WATERS BY BOTTOM DEPOSITS,
For primary bibliographic entry see Field 02H.
W69-06859

KINETICS OF CONTINUOUS CULTIVATION,
Takeda Chemical Industries Ltd., Osaka (Japan). Microbiological Research Labs.
Takehiko Kono, and Tsunetomo Asai.
Biotechnology and Bioengineering, Vol XI, Issue 1, pp 19-36, 1969. 10 fig, 4 tab, 5 ref.

Descriptors: *Kinetics, *Equations, Bioassay, Growth rates, Microorganisms, Mathematical studies, Theoretical analysis.
Identifiers: *Kinetic theory, *Continuous cultivation, Microbial growth, Population dynamics, Chemostats, Critical concentration, Coefficient of consumptive activity, Mutant populations.

The kinetics of continuous cultivation are developed by applying the theory of microbial cell growth presented previously by the authors. The theory is based on the concepts of critical cell concentration and a coefficient of consumptive activity. The kinetics of both single-stage and multistage reactors are developed and equations describing changes in cell concentration during the different phases of growth are given. Productivity of cell mass is defined and it is shown that productivity decreases as the number of stages of multistage reactors increases. Population characteristics of contaminants and mutants in continuous cultivation are considered by assuming that growth rate is proportional to that of the original cells. (Uttormark-Wis)
W69-06863

PROVISIONAL ALGAL ASSAY PROCEDURE,
Joint Industry-Government Task Force on Eutrophication, New York.
For primary bibliographic entry see Field 05A.
W69-06864

ALGAL CULTURE: FROM LABORATORY TO PILOT PLANT.

Carnegie Institution of Washington Publication 600, 357 pp, Washington, DC, March 1961. 103 fig, 59 tab, 297 ref.

Descriptors: *Algae, *Research and development, Bibliographies, Chlorella, Chlorophyta, Diatoms, Light, Lipids, Nutrient requirements, Organic matter, Photosynthesis, Temperature, Tropical regions.
Identifiers: *Algal culture, *Laboratory studies, *Mass culture, *Pilot-plant studies, Algal growth, Algal nutrition, Algal physiology, American Research and Development Corp (Mass), Arthur D Little Inc (Mass), Carnegie Dept of Plant Biology, Carnegie Institution of Washington, Chemical composition (England), Food sources, Greenhouse studies, Growth kinetics, Industrial raw materials (Israel), Light-energy conversion, Mineral nutrition, Research Corporation of NY, Stanford Research Institute (Calif), Sterols.

Research sponsored by the Institution is summarized, both in-house and contractual, on mass culture of algae in its basic aspects and in the developmental and engineering phases of harvesting and utilization as food. The scope is indicated by the subject-matter of chapters by various authors: Current status of large-scale culture of algae; need for new food-sources; biology of algae summarized; algal growth characteristics as applied to mass culture; efficiency of light-energy conversion in Chlorella; photosynthesis by Chlorella in flashing light; effect of diurnally intermittent light on Chlorella; inorganic nutrition of algae; laboratory experiments on Chlorella culture at Institution's laboratory; production of organic matter by chlorophytes and diatoms; non-sterile greenhouse culture; algal accumulation of lipids; British experiments; tropical cultivation of algal complexes; Israeli experiments; Chlorella growth kinetics; pre-pilot-plant and pilot-plant studies in mass culture; chemical composition of algae; nutritional values; algae as industrial raw materials; sterol content of algae. A selected general bibliography and list of literature cited is included. (Eichhorn-Wis)
W69-06865

CONTINUOUS CULTURE OF TORULOPSIS UTILIS WITH OXYGEN THE LIMITING NUTRIENT,
Wisconsin Univ., Madison. Dept. of Biochemistry.
Don Kuhner Button.
PhD Thesis, Wisconsin Univ, 1964. 57 p, 12 fig, 7 tab, 21 ref, 3 append.

Descriptors: *Yeasts, *Oxygen, Microbiology, Growth rates, Model studies, Kinetics, Water pollution effects, Eutrophication.
Identifiers: *Continuous culture, *Torulopsis utilis, *Limiting nutrients, Chemostats, Michaelis-Menton equation, Saturation constants, Growth kinetics, Microbial nutrition.

The yeast, Torulopsis utilis, was grown in continuous culture to determine the effect of low oxygen

on growth rate. The Michaelis-Menton equation which relates growth rate to limiting nutrient concentration was used as a basis for analysis. The maximum growth rate was found to be 0.506/hours, and the saturation constant (oxygen concentration which produces growth at one-half the maximum rate) was determined to be 0.000014 Molar. The assumptions on which the theory of continuous culture is based were examined and for the conditions of this study it was concluded that: (1) the Michaelis-Menton equation provides a reasonable description of growth rate as a function of oxygen concentration; (2) steady-state did exist in the reactor and could be approached from both directions; (3) nearly all cells produced were viable thus growth rate was determined solely by the hydraulic residence time of the reactor; and (4) mixing in the reactor was sufficiently complete to allow steady-state conditions to become established. (Uttormark-Wis)
W69-06866

TROSCLAIR V SUPERIOR OIL CO (DAMAGES TO OYSTERS FROM OIL CONTAMINATION).
For primary bibliographic entry see Field 06E.
W69-06908

MICROORGANIC MATTER IN WATER,
Carnegic-Mellon Univ., Pittsburgh, Pa.
For primary bibliographic entry see Field 05A.
W69-06968

UPTAKE AND ASSIMILATION OF NITROGEN IN MICROECOLOGICAL SYSTEMS,
Geological Survey, Menlo Park, Calif.
G. G. Ehrlich, and K. V. Slack.
ASTM STP No. 448, Symp on Microorganic Matter in Water, Amer Soc Testing Mater 71st Annu Meeting, June 23-28, 1968, San Francisco, pp 11-23, Feb 1969. 13 p, 5 fig, 2 tab, 29 ref.

Descriptors: *Nitrogen compounds, *Nutrients, *Algae, *Microorganisms, Biodegradation, Nitrification, Denitrification, Organic compounds, Ammonia, Nitrites, Nitrates, Yeasts, Bacteria, Aquatic bacteria, Water pollution effects.
Identifiers: Nitrogen assimilation.

A study of biological nitrogen removal utilized 2 recirculating laboratory streams. The sole nitrogen source in 1 stream was calcium nitrate and in the other was yeast extract. Nitrite and nitrate increased slightly. Bacteria and combined nitrogen decreased rapidly after the initial rise. In the stream with the inorganic nitrogen medium, about half of the nitrate disappeared in 2 weeks, and nitrate was undetectable after the 3rd week. Bacterial counts were relatively low and constant. Periphyton increased in both streams as nutrients decreased, reaching quasi-steady states after about 4 weeks. The rate of biomass increase was greater in the inorganic medium. Nitrate was directly assimilated by algae. Organic nitrogen was converted to ammonia by proteolytic bacteria. Ammonia from organic compounds was partly assimilated by algae and partly nitrified by bacteria. Nitrate of bacterial origin was assimilated by algae. Nitrification apparently was not of major importance in converting organic nitrogen to algal biomass. Laboratory streams simulate natural streams in diurnal cycles of pH and dissolved oxygen, in periphyton growth rate and biomass, and in assimilation of nutrients. Use of model systems to study natural processes under controlled conditions appears justified. (Knapp-USGS)
W69-06970

A SPECIAL CASE, THERMAL DIGITAL SIMULATION OF WASTE HEAT DISCHARGES,
Battelle Memorial Inst., Richland, Wash.; and Computer Sciences Corp., Richland, Wash.
R. T. Jaske, and J. L. Spurgeon.
Water Res, Vol 2, No 11, pp 777-802, Nov 1968. 26 p, 16 fig, 10 ref. AT (45-1) 1830 USAEC.

Descriptors: *Thermal pollution, *Path of pollutants, *Computer models, Mathematical models, Systems analysis, Digital computers, Computer programs, Heat budget, Heated water, Thermal powerplants, Simulations analysis.
Identifiers: Digital simulation.

A thermal budget method is used in a digital computer simulation of the effects of thermal discharges combined with both conservative and non-conservative effluents. Digital computer flow charts are presented and the computations are discussed. (Knapp-USGS)
W69-06979

LEGAL CONTROL OF THERMAL POLLUTION,
For primary bibliographic entry see Field 06E.
W69-07054

EUTROPHICATION -- CAUSES AND EFFECTS,
Michigan Univ., Ann Arbor. Dept. of Sanitary and Water Resources Engineering.
J. A. Borchardt.
J Amer Water Works Ass, Vol 61, No 6, pp 272-275, June 1969. 4 p, 2 fig, 1 tab, 1 photo, 4 ref.

Descriptors: *Eutrophication, *Water pollution sources, *Lakes, Nutrients, Fertilizers, Phosphates, Nitrates, Algae, Great Lakes.
Identifiers: Eutrophication prevention, Ecologic imbalances.

The causes and effects of accelerated eutrophication of lakes and streams are outlined. The important natural factors involved are geology, lake basin geometry and size, type and size of watershed, and latitude. The most important single variable is man's treatment of the lake. Accelerated eutrophication is a result of accelerated addition of phosphorus and nitrogen nutrients, nearly always caused by some form of human activity. Fertilizers, municipal wastes, industrial wastes, and recreational wastes are the most common nutrient sources. The most visible and obnoxious result of eutrophication is algae growth. Correction of eutrophic conditions is almost impossible. Prevention is necessary to avoid the problem in the future. (Knapp-USGS)
W69-07084

EFFECTS OF DAM REAERATION ON WASTE ASSIMILATION CAPACITIES OF THE MOHAWK RIVER,
New York State Dept. of Health, Albany. Bureau of Water Quality Management.
For primary bibliographic entry see Field 05G.
W69-07118

5D. Waste Treatment Processes

DIRECT CYCLE WATER REUSE PROVIDES DRINKING WATER SUPPLY IN SOUTH AFRICA,
National Inst for Water Research, Pretoria (South Africa).
G. J. Stander, and J. W. Funke.
Water and Wastes Eng, Vol 6, No 5, pp 66-68, May 1969. 3 p, 2 fig, 3 tab.

Descriptors: *Water reuse, *Reclaimed water, *Potable water, *Water quality, Sewage treatment, Municipal wastes, Industrial wastes, Municipal water, Water supply.
Identifiers: *South Africa.

In South Africa direct reuse of water for municipal supply is necessary because of limited water availability. The reclamation system of Windhoek consists of conventional sewage treatment, a maturation pond system, algae removal processing, and activated carbon filtration. Chemical analyses of reclaimed water, effluent quality, and bacterial removal data are tabulated. (Knapp-USGS)
W69-06942

CENTRAL WASTE HANDLING AT BAYPORT,
Friendswood Development Co., Houston, Tex.
George B. Meriwether.
Ind Water Eng, Vol 6, No 5, pp 35-37, May 1969. 3 p, 1 fig, 1 photo.

Descriptors: *Waste water treatment, *Industrial wastes, *Texas, Activated sludge, Water pollution control, Waste water disposal, Effluents, Facilities.
Identifiers: Bayport industrial complex (Texas).

Central waste treatment is recommended for groups of industrial plants in industrial complexes. Central treatment is more economical than individual facilities and is better for meeting effluent-standard regulations. At the Bayport industrial complex, Texas, an activated sludge plant costing over $6 million serves a 9,000-acre heavy-industry park with 10 industrial plants. Ultimate planned capacity is 40 mgd. Effluent criteria, input criteria, and non-acceptable wastes are tabulated. (Knapp-USGS)
W69-06944

ADSORPTION IN MULTICOMPONENT SOLUTION BY ACTIVATED CARBON,
Rhode Island Univ., Kingston. Dept. of Civil Engineering; and Rutgers - The State Univ., New Brunswick, N. J.
Calvin P. C. Poon, and Maw-hao Sung.
Water Resources Bull, Vol 5, No 1, pp 39-46, Mar 1969. 8 p, 3 fig, 3 tab, 7 ref.

Descriptors: *Tertiary treatment, *Activated carbon, *Adsorption, Nutrients, Organic compounds, Detergents, Sewage treatment.
Identifiers: Avtivated carbon regeneration.

It was found that the total adsorptive capacity of activated carbon was enhanced by using a multicomponent solution with glucose, peptone and phenylphosphonic acid. The removal of glucose was increased in the presence of phenylphosphonic acid. A maximum use of the carbon adsorptive capacity is possible if the carbon is used for tertiary treatment followed by treating a stronger waste.
W69-07099

THE COST OF CLEAN WATER AND ITS ECONOMIC IMPACT.
Federal Water Pollution Control Administration, Washington, D. C.

Fed Water Pollut Contr Admin Rep on Clean Waters, Vol 1, Jan 1969. 220 p, 15 fig, 53 tab, 22 ref.

Descriptors: *Water pollution control, *Sewage treatment, *Water quality act, *Economic impact, Costs, Municipal wastes, Industrial wastes, Farm wastes, Acid mine water, Water quality, Water quality control, Legislation, Waste disposal, Tertiary treatment, Water management (Applied).
Identifiers: *FWPCA.

National requirements and costs of water pollution control are summarized and national clean water goals are outlined. Over 90% of the Nation's sewered population is also served by waste treatment plants, and 60% with secondary treatment. Prevalence of treatment is greatest west of the Mississippi. Most of the untreated discharge is in New England, New York, and Pennsylvania. Generally, industrial waste-handling improvement investment is at about the level recommended by FWPCA, but municipalities are spending half that amount. The problems and recommendations made for improvement of present treatment and addition of new facilities are discussed in detail. (Knapp-USGS)
W69-07109

INDUSTRIAL WASTE CONFERENCE,
Purdue Univ., Lafayette, Ind.
Don E. Bloodgood.
Proc of 23rd Ind Waste Conf, May 7-9, 1968, Purdue Univ, Part 1, 1969. 618 p.

Descriptors: *Industrial wastes, *Water reuse, *Waste treatment, Waste identification, Water pollution treatment, Reaeration, Waste disposal, Waste water disposal, Injection wells, Water chemistry, Dissolved oxygen.
Identifiers: Industrial Waste Conference.

The 23rd annual Industrial Waste Conference, Purdue University, 1968, discussed means of treating industrial waste, industrial reuse of municipal waste water, and water pollution treatment in streams. Recovery of materials from wastes and identification of waste materials were also discussed. (Knapp-USGS)
W69-07110

ION EXCHANGE TREATMENT OF ACID MINE DRAINAGE,
Bethlehem Steel Corp., Pa. Homer Research Labs.; and Bethlehem Steel Corp., Pa. Engineering Dept.
J. J. Sterner, and H. A. Conahan.
Proc of 23rd Ind Waste Conf, May 7-9, 1968, Purdue Univ, Part 1, pp 101-110, 1969. 10 p, 3 fig, 3 tab, 1 ref.

Descriptors: *Water pollution control, *Waste water treatment, *Acid mine water, *Ion exchange, Neutralization, Limes, Mine acids, Iron, Sulfates.
Identifiers: Acid mine water treatment, Acid mine drainage.

A pilot plant using ion exchange to reduce pH, sulfate, and iron concentrations in acid mine drainage demonstrates that 15% aqueous sodium chloride solution is feasible regenerant for an ion exchange treatment in a process to produce effluent complying with the discharge standards of the Pennsylvania Sanitary Water Board. The cations, including dissolved iron, are concentrated into a waste stream which is only 1.7% of the volume of the original contaminated stream. The slight residual acidity of the product water is eliminated by treatment with lime. Larger amounts of lime are required to neutralize the waste stream, and this should be done at about 180 F. The neutralized waste stream can be settled to a sludge containing 10.5% solids or can be dewatered by filtering at 180-190 F to a cake containing 25% solids. Costs were $0.166 for NaCl, $0.109 for CaO, and $0.019 for heating per 1000 gals of acid mine water. The quantity of lime required for neutralizing both the waste stream and the residual acidity of the processes stream would be the same as the quantity required for straight lime neutralization of the raw water, approximately 10.9 lbs CaO per 1000 gals of acid mine water.
W69-07112

WATER REUSE AT THE CELULOSA Y DERIVADOS, S. A. PLANTS,
Celulosa y Derivados S.A., Monterrey (Mexico). Copropiedad Grupo Quimico.
Hector J. Gomez.
Proc of 23rd Ind Waste Conf, May 7-9, 1968, Purdue Univ, Part 1, pp 165-169. 5 p, 2 tab.

Descriptors: *Water reuse, *Sewage treatment, *Waste water treatment, Activated sludge, Filtration, Ion exchange, Industrial water, Water supply, Municipal wastes.
Identifiers: *Monterrey (Mexico), Celelosa y Derivados.

Reuse of municipal waste water for industrial production in Monterrey, Mexico is described. About 60% of the city's water is reused by over 30 industries. Celulosa y Derivados was the first to purify domestic wastes. Raw sewage is sent to the treatment plant in a 10 mi long 24 in line. The first treatment is by an activated sludge process with a 2.2 mgd capacity. The chlorinated effluent is used for irrigation, fire protection, cooling, and input for tertiary treatment. Water for industrial process uses is clarified, softened and filtered. High-purity water is demineralized by ion exchange. Chemical analyses of waters in various treatment stages are tabulated. The activated sludge treatment costs $.07 per 1,000 gal, lime-aluminate filtration adds a cost of $0.18, and ion exchange adds $0.40. (Knapp-USGS)
W69-07113

SPRAY IRRIGATION OF ORGANIC CHEMICAL WASTES,
Commercial Solvents Corp., Terre Haute, Ind.
Richard A. Woodley.
Proc of 23rd Ind Waste Conf, May 7-9, 1968, Purdue Univ, Part 1, pp 251-261, 1969. 11 p, 1 fig, 3 tab.

Descriptors: *Waste water disposal, *Irrigation, *Chemical wastes, Sprinkler irrigation, Infiltration, Groundwater, Water levels, Water quality, Biochemical oxygen demand, Suspended load.
Identifiers: Organic chemical wastes.

At the Terre Haute, Indiana plant of Commercial Solvents Corporation, a spray irrigation system has been successfully utilized since August 1965 for treatment of high strength, low volume waste from aerobic industrial fermentation processes. Wastes varying in BOD up to 64,700 mg/l, suspended solids up to 99,700 mg/l, and flows up to 160,000 gpd have been routinely sprayed on 100 one-acre plots without causing any environmental nuisances or any community problems whatsoever. The land application system has been managed so that total treatment of all applied wastes has been achieved. Land and system management has consisted of spray plot selection, application time control, elimination of surface runoff, and control of surface ponding. Continuous wintertime operation has been achieved by pre-planning for minus zero C operations and the installation of rapid draining spray headers and laterals. Equipment subject to 24 hr contaminant of liquid is protected by various types of electrical heaters.
W69-07114

FOAM SEPARATION BEHAVIOR OF AQUEOUS SUSPENSIONS OF CLAYS AND/OR IRON,
Marquette Univ., Milwaukee, Wis. Dept. of Civil Engineering; and Kentucky Univ., Lexington. Dept. of Chemical Engineering.
C. J. Crandall, and R. B. Grieves.
Water Res, Vol 2, No 12, pp 817-832, Dec 1968. 16 p, 6 fig, 4 tab, 17 ref.

Descriptors: *Clays, *Iron, *Iron compounds, *Flotation, *Foam separation, Foaming, Surfactants, Surface tension, Water pollution treatment, Water treatment, Water purification, Foam fractionation, Sewage treatment, Tertiary treatment.
Identifiers: Foam flotation, Clarification.

To establish the relative efficiencies of foam separation of kaolinites, illites, and montmorillonites and to produce a further understanding of phenomena occurring at clay-water-air interfaces, and extensive experimental investigation is conducted. The study includes the effect that each of 6 clays has on the foam separation of iron, both divalent and trivalent, and any influence that iron may provide to the flotation of the clays. The effects are established on clay flotation, on iron flotation, on surfactant flotation, and on foamability, of clay type, of pH, and of the presence and form (determined by pH) of iron. A cationic surfactant, ethylhexadecyldimethylammonium bromide, is employed as the foam separation agent over the pH range 2.5-11.5. In general, the montmorillonites exhibit exceptional behavior due to their large specific surface and high exchange capacity. Results are interpreted in terms of a basic model involving the interaction of clay particles, surfactant cations, and soluble and/or particulate iron.
W69-07125

THE BACTERIAL DEGRADATION OF SYNTHETIC ANIONIC DETERGENTS,
Upper Tame Main Drainage Authority, Birmingham (England). Biological Lab.
Roaslynd Cook.
Water Res, Vol 2, No 12, pp 849-876, Dec 1968. 28 p, 15 fig, 11 tab, 13 ref.

Descriptors: *Biodegradation, *Detergents, *Surfactants, *Alkylbenzene sulfonates, Linear alkylate sulfonates, Water pollution treatment, Sewage treatment, Tertiary treatment, Aerobic bacteria.
Identifiers: Household detergent degradation, Slope culture.

Biodegradability of synthetic anionic detergents was studied using the slope culture technique. Solutions of the detergents known as JNX, JNQ, sodium tetrapropylene benzene sulphonate, a 'difficult' alkyl benzene sulphonate and Dobane 055 were inoculated with bacteria from various sewage works effluents which had undergone prior acclimatization to a particular detergent on an agar slope; unacclimatized bacteria were also investigated. Further tests were carried out using a single, standard effluent and a microbial slime from an experimental recirculating filter together with a more stringent testing procedure. The results of all tests showed that the detergents had a low biodegradability value and they were inconsistent. Bacteria which degraded JNX were isolated from a sewage works effluent and from the microbial slime which developed on an an experimental recirculating filter matured on JNX. Inoculation of the bacteria into a detergent solution was found to be ineffective in assessing their detergent degrading ability. A recirculating filter was developed for this purpose and proved to be successful. The active bacteria were members of the genera Klevsiella, Achromobacter, Flavobacterium, and Micrococcus. Degradation occurred in the presence of inert materials such as gravel, asbestos, or dried activated sludge provided that the detergent solution was vigorously agitated. The presence of an additional nutrient such as peptone did not appear to interfere with the normal degradation of the detergent. Attempts were made to induce the bacteria E. coli and Serratia marcescens to degrade JNX in a recirculating filter; these attempts were unsuccessful.
W69-07126

5E. Ultimate Disposal of Wastes

UNDERGROUND WASTE DISPOSAL,
Bradley Oil Corp., Tulsa, Okla.
J. L. Wright.
Ind Water Eng, Vol 6, No 5, pp 24-27, May 1969. 4 p, 8 fig, 4 tab, 5 ref.

Descriptors: *Waste disposal, *Industrial wastes, *Injection wells, Aquifers, Water quality, Legal aspects, Porosity, Permeability, Costs, Economics.
Identifiers: Deep-well waste disposal.

Deep-well disposal of industrial wastes is recommended for areas where laws and geological formations are favorable. The geology of several areas with favorable geologic conditions is discussed and estimated costs of injection and surface disposal are tabulated. (Knapp-USGS)
W69-06943

DIFFUSER DESIGN FOR DISCHARGE TO A STRATIFIED WATER,
Danish Isotope Center, Copenhagen.
Poul Harremoes.
Water Res, Vol 2, No 11, pp 737-752, Nov 1968. 16 p, 12 fig, 20 ref.

Descriptors: *Sewage disposal, *Outlets, *Coasts, *Density stratification, Currents (Water), Diffusion, Water pollution control, Flow, Ocean currents.
Identifiers: *Denmark, *Sweden, Diffusers, Outfall design.

Results from several tracer experiments with submerged sewage fields in long-shore currents having pronounced stratification are used as a basis for the economical optimization of a discharge of domestic sewage through a diffuser. Existing theories on jet

diffusion have been modified to fit the observed conditions, which have almost arbitrarily varying density distributions. A first approximation to dispersion in stratified flow is applied with data derived from tracer experiments. Bacterial decay is disregarded due to the very slow decay rates previously observed in The Sound, which is the strait between Denmark and Sweden. The computation of fet diffusion and stratified dispersion is computerized to meet the demand for a statistical prediction of pollution and for selecting the most economical design among the infinite number of possible outfall designs. Density effects on the sewage field are suggested to be of significance to design criteria for diffusers.
W69-06978

DEEP WELL INJECTION OF INDUSTRIAL WASTES,
Hydro-Development, Inc., Bakersfield, Calif.
John C. Manning.
See also W69-07110. Proc of 23rd Ind Waste Conf, May 7-9, 1968, Purdue Univ, Part 2, pp 655-666, 1969. 12 p, 7 fig.

Descriptors: *Injection wells, *Waste disposal, *Industrial wastes, Aquifers, Groundwater movement, Waste water disposal, Water quality, Waste water treatment, Water levels, Permeability, Porosity.
Identifiers: Waste water injection.

When water is injected into a confined subsurface formation, the pressure in the formation is increased, and the formation tends to dilate. There is ample space in the subsurface reservoir for injection of large quantities of fluid so long as an areally extensive injection formation is available. Almost any area underlain by sedimentary rocks could have potential disposal reservoirs. Igneous or metamorphic rocks might have favorably situated subsurface zones, but generally these will not be as favorable as will the sedimentary rocks. Any waste fluid that is free of particulate matter and that, after reasonable treatment, will not cause undesirable reactions with the solid matrix of the disposal formation or its original fluid should be suitable for injection disposal. However, injection disposal is expensive and is best suited for relatively small quantities of particularly noxious wastes. All types of water desalination schemes have the problem of concentrated brine disposal, and where there is no convenient ocean, an injection well might provide a safe and convenient disposal.
W69-07117

5F. Water Treatment and Quality Alteration

REGIONAL SANITARY SEWER DISTRICT LAW.
For primary bibliographic entry see Field 06E.
W69-06925

THE PROBLEM OF MAKING WASTE WATER SAFE AND ITS USE IN IRRIGATING LIGHT CHESTNUT SOILS IN THE POVOLZHYE AREA,
Volgograd Agricultural Inst. (USSR).
For primary bibliographic entry see Field 03C.
W69-07005

INDUSTRIAL WASTE CONFERENCE,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 05D.
W69-07110

5G. Water Quality Control

CULTURAL EUTROPHICATION IS REVERSIBLE,
Wisconsin Univ., Madison. Lab. of Limnology.
Arthur D. Hasler.
BioScience, Vol 19, No 5, pp 425-431, May 1969. 3 fig, 1 tab, 7 ref.

Descriptors: *Eutrophication, *Fertilization, *Limnology, *Phytoplankton, Fish, Great Lakes, Legislation, Nitrogen, Nuisance algae, Phosphorus, Washington, Wisconsin, California.
Identifiers: *Cultural eutrophication, Lake Monona (Wis), Lake Tahoe (Calif), Lake Washington (Wash), Zurichsee (Switzerland).

Various human activities contribute to excessive enrichment (cultural eutrophication) of waters. Among the symptoms of cultural eutrophication are nuisance blooms of algae, increased nutrient levels, depletion of hypolimnetic oxygen, increased turbidity, and changes in the species-compositions of phytoplankton, invertebrates, and fishes. A case history is presented (Zurichsee) documenting changes in limnological conditions, as well as additional relevant data from North American lakes. As methods of solving the problems of cultural eutrophication, author suggests that more extensive dissemination of information, involvement of all citizens and citizen groups in workshops and seminars, and enlightened legislation. The Wisconsin Resources Law (1965) is given as an example of legislation and the philosophy of zoning is discussed. Three examples are given (Lakes Monona, Tahoe, Washington) where success is curbing cultural eutrophication has been achieved. Methods of control and harvesting aquatic plants and fish are discussed; also chemical control and sewage utilization. Table gives estimates of nitrogen and phosphorus input to Wisconsin surface waters. See also W68-00680. (Voigtlander-Wis)
W69-06858

INTERSTATE SANITATION COMMISSION - TRI STATE COMPACT.
For primary bibliographic entry see Field 06E.
W69-06889

STREAM STANDARDS AND WATER SUPPLIES,
Howard D. Zeller.
J Amer Waterworks Ass'n, Vol 61, No 3, pp 131-132, Mar 1969. 2 p.

Descriptors: *Water quality act, *Pollution abatement, *Regulation, *Long-term planning, Water pollution control, Water pollution effects, Water pollution sources, Water resources development, Water purification, Water quality control, Federal government, State governments, Legal aspects, Legislation, Planning.
Identifiers: *Clean Water Restoration Act.

The role of the federal government in the field of water pollution abatement is stated in the Water Quality Act of 1965 and the Clean Water Restoration Act of 1966. These acts establish a framework for the development of water quality standards by the states in cooperation with the federal government. The development of stream standards (including minimum water quality criteria and stream classification) and of plans for abatement of existing pollution are the basic objectives of the program. Stream standards provide the elements for long-range planning in the broad field of water resource management. The development of water quality criteria through the subcommittees named under the acts (National Technical Advisory Committee, NTAC) is a significant new development in the water pollution control field. Federal publication of the NTAC report and acceptance of all the state water quality criteria therein contained are the first steps in the development of a strong national program designed to enhance the quality of the nation's water resources. (Carruthers-Fla)
W69-06899

WATER POLLUTION CONTROL.
For primary bibliographic entry see Field 06E.
W69-06926

INTERSTATE SANITATION COMMISSION.
For primary bibliographic entry see Field 06E.
W69-06939

WORKSHOP ON WATER RESOURCE PROBLEMS AND RESEARCH NEEDS RELATED TO AGRICULTURE IN THE COASTAL PLAINS OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Water Resources Research Inst.
For primary bibliographic entry see Field 03F.
W69-06945

MICROBES AND MICROORGANICS IN WATER - A REVIEW,
Koppers Co., Inc., Monroeville, Pa. Dept. of Research.
G. R. Tallon.
ASTM STP No 448, Symp on Microorganic Matter in Water, Amer Soc Testing Mater 71st Annu Metting, June 23-28, 1968, San Francisco, pp 3-10, Feb 1969. 8 p, 17 ref.

Descriptors: *Biodegradation, *Organic matter, *Organic compounds, Industrial wastes, Water reuse, Biochemistry, Anaerobic bacteria, Aquatic microbiology, Sewage treatment, Water pollution treatment.
Identifiers: Non-degradable organic wastes.

Biological degradation in a stream is a highly complex, 'assembly-line' process. Most water-borne organics are consumed by microbes, but some substances may persist for long periods. Sources of refractory compounds may be industrial wastes, sewage plant discharges, land drainage, and even metabolic residues from microbial degradation of pollutants. Separation and identification of trace organics is an extremely difficult process requiring the most refined and sophisticated analytical methods. Increasing reuse of surface waters will require more surveillance and new approaches in water management. (For main entry see W69-06968.)
W69-06969

ANALYSIS FOR ORGANIC PESTICIDES IN AQUATIC ENVIRONMENTS,
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Environmental Sciences; Rutgers - The State Univ., New Brunswick, N. J. Bureau of Conservation; and Drexel Inst. of Tech., Philadelphia, Pa.
For primary bibliographic entry see Field 05A.
W69-06971

GROUND-WATER POLLUTION FROM NATURAL GAS AND OIL PRODUCTION IN NEW YORK,
Geological Survey, Albany, N. Y.
For primary bibliographic entry see Field 05B.
W69-06975

OPTIMAL RELEASE SEQUENCES FOR WATER QUALITY CONTROL IN MULTIPLE-RESERVOIR SYSTEMS,
Michigan Univ., Ann Arbor.
Norbert Antone Jaworski.
Fed Water Pollut Contr Admin, Chesapeake Bay-Susquehanna River Basin Proj Tech Pap No 13, 1968. 231 p, 34 fig, 20 tab, 90 ref, 5 append. PhD dissertation - Michigan Univ.

Descriptors: *Water quality control, *Flow augmentation, *Reservoir operation, *Mathematical models, Computer models, Digital computers, Computer programs, Optimization, Dynamic programming, Operations research, Systems analysis, Simulation analysis, Synthetic hydrology.
Identifiers: *Potomac River Basin.

A method for determining optimal flow release sequences from multiple reservoir systems for water quality control was developed and field tested. The problem was organized as a converging

ranch multistage dynamic programming decision ystem with 5 options for determining optimal elease sequences at a decision point. These are: 1) minimum DO deficit for given BOD; (2) ninimum DO deficit; (3) least cost of storage for iven BOD; (4) least cost of storage; and (5) ninimum BOD. A mathematical model of a river ystem including tributaries and impoundments vas developed to simulate the river basin in the ecision process. The Potomac River basin was sed as a basis for the model and for field checks. Digital computer flow charts and program listings re included for the stream model and the release nodel. Data needs and costs are discussed and ecommendations are made for data collection and nalysis schemes for use in attaining optimal con- rol of water quality in multiple reservoir systems. (Knapp-USGS)
W69-06982

GULF REFINING CO V DAVIS (SEEPAGE FROM A SALT WATER PIT).
For primary bibliographic entry see Field 06E.
W69-07016

MAGNOLIA PETROLEUM CO V WILLIAMS (PROOF OF WATER WELL CONTAMINATION FROM SALT WATER DISPOSAL PIT).
For primary bibliographic entry see Field 06E.
W69-07017

CARVER V TANNER (DISCHARGE OF SALT WATER INTO STREAM).
For primary bibliographic entry see Field 06E.
W69-07019

PURDY V CITY OF NEWBURGH (REGULATION OF RIPARIAN RIGHTS WITH RESPECT TO WATER SUPPLY).
For primary bibliographic entry see Field 06E.
W69-07028

A DARLING CO V WATER RESOURCES COMM'N (ADMINISTRATIVE REGULATION OF POLLUTION).
For primary bibliographic entry see Field 06E.
W69-07029

DELAWARE RIVER ABOVE AND BELOW TRENTON FALLS WITHIN JURISDICTION OF NEW JERSEY AND PENNSYLVANIA.
For primary bibliographic entry see Field 06E.
W69-07034

TAKING STURGEON; TAKING FOOD FISH WITH SCINE OR GILL NET; FINE AND FORFEITURE; USE OF CERTAIN NETS PROHIBITED; FINE AND FORFEITURE; PROHIBITED HOURS FOR FISHING; FINE AND FORFEITURE; USE OF PARALLEL NETS PROHIBITED.
For primary bibliographic entry see Field 06E.
W69-07036

STREAM OBSTRUCTION AND DUMPING.
For primary bibliographic entry see Field 06E.
W69-07052

LEGAL CONTROL OF THERMAL POLLUTION,
For primary bibliographic entry see Field 06E.
W69-07054

GRANT V UNITED STATES (SEWAGE DISPOSAL IN TIDAL WATERS).
For primary bibliographic entry see Field 06E.
W69-07057

COUNTY SEWER SURVEY COMMISSIONERS.
For primary bibliographic entry see Field 06E.
W69-07077

RESEARCH ON RECREATIONAL USE OF WATERSHEDS AND RESERVOIRS,
Public Health Service, Cincinnati, Ohio. Div. of Criteria and Standards.
For primary bibliographic entry see Field 06D.
W69-07085

COMPUTER-PRODUCED TABLES, MAPS, AND DIAGRAMS AS TOOLS IN THE INTERPRETATION OF BRINE DATA FROM SOUTHEASTERN KANSAS,
Geological Survey, Washington, D. C.
Jesse M. McNellis, Charles O. Morgan, and Brent H. Lowell.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 303-324, Mar 1969. 22 p, 11 fig, 2 tab, 8 ref.

Descriptors: *Water chemistry, *Brines, *Data processing, *Digital computers, *Kansas, Computer programs, Data collections, Maps, Water qualtiy, Ions.
Identifiers: *Piper diagrams, Stiff diagrams, Tabulation, Automatic data plotting.

The applicability of computer-oriented techniques to assist in the interpretation of brine data is demonstrated by the use of 6 programs on data from 2 example areas. These programs include a data-tabling routine; routines for producing Stiff, Piper, and Ropes diagrams; programs for calculating ionic ratios; and programs for plotting maps of chemical data. The examples illustrate: (1) the range in water quality and contamination of potable water by brines in Stafford, Pratt, and Barber Counties, and (2) the change in water quality in the Arbuckle Group from southeast to south-central Kansas. (USGS)
W69-07102

CHEMICAL COMPOSITION OF SELECTED KANSAS BRINES AS AN AID TO INTERPRETING CHANGE IN WATER CHEMISTRY WITH DEPTH,
Geological Survey, Lawrence, Kans.; Kansas Univ., Lawrence; and Kansas State Geological Survey, Lawrence.
Robert J. Dingman, and Ernest E. Angino.
Proc of Symp on Geochem of Subsurface Brines, Kansas Univ, Mar 25-26, 1968. Chem Geol, Vol 4, No 1-2, pp 325-339, Mar 1969. 15 p, 10 fig, 1 tab, 17 ref.

Descriptors: *Water chemistry, *Brines, *Oil fields, *Kansas, Saline water systems, Saline water, Solutes, Aqueous solutions, Groundwater, Chemical reactions, Equilibrium, Ions, Ion exchange, Geochemistry, Aquifers, Connate water.
Identifiers: *Anomalous brines.

Chemical analyses of approximately 1,881 samples of water from selected Kansas brines define the variations of water chemistry with depth and aquifer age. The most concentrated brines are found in the Permian rocks which occupy the intermediate section of the geologic column of this area. Salinity decreases below the Permian until the Ordovician (Arbuckle) horizon is reached and then increases until the Precambrian basement rocks are reached. Chemically, the petroleum brines studied in this small area fit the generally accepted pattern of an increase in calcium, sodium and chloride content with increasing salinity. They do not fit the often-predicted trend of increases in the calcium to chloride ratio, calcium content and salinity with depth and geologic age. The calcium to chloride ratio tends to be asymptotic to about 0.2 with increasing chloride content. Sulfate tends to decrease with increasing calcium content. Bicarbonate content is relatively constant with depth. If many of the hypotheses concerning the chemistry of petroleum brines are valid, then the brines studied are anomalous. An alternative lies in accepting the thesis that exceptions to these hypotheses are rapidly becoming the rule and that indeed we still do not have a valid and general hypothesis to explain the origin and chemistry of petroleum brines. (USGS)
W69-07103

ION EXCHANGE TREATMENT OF ACID MINE DRAINAGE,
Bethlehem Steel Corp., Pa. Homer Research Labs.; and Bethlehem Steel Corp., Pa. Engineering Dept.
For primary bibliographic entry see Field 05D.
W69-07112

SPRAY IRRIGATION OF ORGANIC CHEMICAL WASTES,
Commercial Solvents Corp., Terre Haute, Ind.
For primary bibliographic entry see Field 05D.
W69-07114

INVESTIGATION OF THE EFFECTS OF CHANNEL GEOMETRY AND SURFACE VELOCITY ON THE REAERATION RATE COEFFICIENT,
New Mexico State Univ., University Park. Dept. of Sanitary Engineering; and Shell Oil Co., Bakersfield, Calif.
W. P. Isaacs, and J. A. Maag.
See also W69-07110. Proc of 23rd Ind Waste Conf, May 7-9, 1968, Purdue Univ, Part 2, pp 619-639, 1969. 21 p, 6 fig, 4 tab, 17 ref.

Descriptors: *Reaeration, *Channel morphology, Open-channel flow, Turbulence, Hydraulics, Shape, Width, Depth, Streamflow.
Identifiers: Reaeration coefficient.

A mathematical model of the relationship of channel geometry and reaeration coefficient is proposed based on a review of the literature and evaluation of published data. The proposed model compares well with Churchill's natural stream reaeration data. (Knapp-USGS)
W69-07116

EFFECTS OF DAM REAERATION ON WASTE ASSIMILATION CAPACITIES OF THE MOHAWK RIVER,
New York State Dept. of Health, Albany. Bureau of Water Quality Management.
Michael A. Mastropietro.
See also W69-07110. Proc of 23rd Ind Waste Conf, May 7-9, 1968, Purdue Univ, Part 2, pp 754-765, 1969. 12 p, 11 fig.

Descriptors: *Reaeration, *Dams, *New York, *Turbulence, *Overflow, Outlet works, Discharge (Water), Streamflow, New York State Barge Canal, Regression analysis.
Identifiers: *Mohawk River (NY).

Methods were developed to calculate stream reaeration where water falls over dams and weirs on the Mohawk River, N.Y. Dissolved oxygen and temperature data were collected above and below all the dams between Rome and the Hudson River. A linear regression analysis was made with saturation below the dam as the dependent variable and saturation above the dam as the independent variable. In the regression for the 15-ft dams with 25 observations, the correlation coefficient was 0.94531 with an F value of 201.60. The equation of best fit was y= 0.391 x+58.4. For 7-ft dams, 40 observations yielded a correlation coefficient of 0.98713, F= 1485.81, and the equation of best fit was y= 0.789 x+22.9. DO profiles of the river are shown graphically. (Knapp-USGS)
W69-07118

STUDIES ON IN-STREAM AERATION,
Tufts Univ., Medford, Mass.; and National Council of Paper Industries for Air and Stream Improvement, Inc.
James J. McKeown.

See also W69-07110. Proc of 23rd Ind Waste Conf, May 7s9, 1968, Purdue Univ, Part 2, pp 1134-1146, 1969. 13 p, 12 fig, 1 tab, 7 ref.

Descriptors: *Reaeration, *Dams, *Turbulence, *Overflow, Outlet works, Discharge (Water), Streamflow, Waste treatment, Water pollution treatment, Water circulation, Spillways, Dissolved oxygen, Reaeration.
Identifiers: Stream reaeration.

Water falling over dams and subsequent downstream turbulence can aerate water with zero upstream DO, at rates as high as 1.0 lbs oxygen per HP-hr at falls up to 10 ft high. A fall of 17 to 20 ft into relatively shallow water or onto dam aprons will yield near-saturation conditions. Surface aerators in shallow ponds yield transfer efficiencies of about 1-1 1/2 lbs oxygen per HP-hr. Aerator efficiency is affected by recycle patterns of water in close proximity to the aerator containing high DO. Attempts to disturb the flow pattern developed by the surface aerators were partially successful. On/off operation of aerators and the introduction of a flow developer which directed water away from the turbine were investigated. A unidirectional flow pattern or an imbalance in aerator discharge direction incorporated in the design of such aerators for use in similar unrestricted systems warrants further investigation.
W69-07119

UTILITY AS A SURROGATE FOR VALUE IN WATER RESOURCES ANALYSIS,
Rutgers - The State Univ., New Brunswick, N. J.
For primary bibliographic entry see Field 06B.
W69-07158

ON THE NATURE AND SIGNIFICANCE OF SOCIAL COSTS,
Basel Univ. (Switzerland).
For primary bibliographic entry see Field 06C.
W69-07171

QUALITY OF THE ENVIRONMENT: AN ECONOMIC APPROACH TO SOME PROBLEMS IN USING LAND, WATER AND AIR,
Resources for the Future, Inc., Washington, D. C.
Orris C. Herfindahl, and Allen V. Kneese.
Baltimore, Maryland, The Johns Hopkins Press, 1965. 96 p.

Descriptors: *Water pollution, *Air pollution, *Pollution abatement, Oxygen sag, Organic waste, Water quality, Quality control, Pesticides, Transportation, Pesticide residues, Chemical wastes.
Identifiers: *Externalities, *Water quality deterioration costs, Degradable pollutants, Synthetic pollutants, Persistent pollutants, Primary pollutants.

The problem in the water resource area, and the natural resource area as a whole, is not one of exhaustion but rather a deterioration in the quality of the environment. The authors attempt to apply economic reasoning aimed at the balancing of desires in matters of resource planning compared to the costs of satisfying these desires in varying degrees. Five areas are selected where the actions of certain economic units are seriously affecting the use of the environment by others. These areas are: water pollution; air pollution; the purposeful introduction into the environment of chemical substances such as pesticides, insecticides, etc.; some developments in urban activities, architecture, and the use of urban space; the development of the rural countryside and wild areas. For each problem area the nature of the problem is explained along with the economics of the possible corrective measures suggested. The book concludes with a discussion of future research strategy. (Murphy-Rutgers)
W69-07180

DRY COMMENTS ON WATER,
J. K. Colman.
N Y Co Lawyers Ass'n Bar Bull, Vol 23, No 1, pp 9-14, 1965-1966. 6 p, 32 ref.

Descriptors: *New York, *Riparian rights, *Pollution abatement, *Water supply, Prior appropriation, Land tenure, Natural flow doctrine, Diversion, Relative rights, Cities, Legislation, Judicial decisions, Reasonable use, Beneficial purpose, Water pollution, Municipal water, Water law, Legal Aspects.
Identifiers: *Common law, *Civil law, *Interstate common law, N Y S Temporary Comm'n on Water.

Water shortage is the water problem of the future which is manifested today in New York City. Pollution is a prime contributor to the shortage. State legislation in pollution abatement has not been effective, but federal emphasis may bring needed change. The current shortage is related to the common law riparian doctrine itself. Of the four riparian rights concepts (common law, civil law, prior appropriation, interstate common law), the common law doctrine most obstructs beneficial use of water. The common law confines riparian rights to owners of land adjacent to streams. The rights cannot be extended regardless of need, since that would violate downstream rights in undiminished flow. Prior appropriation promotes beneficial use by allowing diversion of water for beneficial use. Although common law rights are subject to 'reasonable' use by other riparians, the difficulty in predicting what is reasonable discourages investment in beneficial use. An unreasonable appropriation can be very costly to the city. Acts and cases bearing on these problems are cited, and the New York State Temporary Commission on Water is seeking to reconcile present law with future needs. (Harrs-Fla)
W69-07199

FEDERAL-STATE RELATIONSHIPS IN THE ADOPTION OF WATER QUALITY STANDARDS UNDER THE FEDERAL POLLUTION CONTROL ACT,
H. E. Dunkelberger.
Nat Resources Lawyer, Vol 11, No 1, pp 47-61, Jan 1969. 15 p, 33 ref.

Descriptors: *United States, *Water quality act, *Water pollution, Water resources development, Pollution abatement, Water pollution control, Effluents, Discharge (Water), Streams, State governments, Wastes, Waste water disposal, Sewage effluents, Cities, Interstate rivers, Adjudication procedure, Administrative agencies, Regulation, Legal aspects, Legislation, Water quality control.

The Water Quality Act provides for adoption of federal standards of water quality only in the event that existing state standards are found inconsistent with the standards of the Act by the Secretary of the Interior. State standards adopted under the Act must protect the public welfare and serve the purposes of the Act. The Act provides that peculiar local conditions and circumstances be considered in formulating standards. This is a manifestation of Congressional rejection of a national effluent standard that would grant the Secretary arbitrary authority over state standards. Further evidence of restraints placed on the Secretary is that he may formulate state standards only after giving the state six months in which to enact suitable standards. If the state does not act, the Secretary must convene a public hearing in the affected area upon request of the governor. The hearing board may modify the standards promulgated by the Secretary. The author submits that the present practice of the Secretary in requiring a state to include specific provisions in its Water Quality Acts is an attempt to establish a national effluent standard and is beyond the authority of the Secretary. (Katz-Fla)
W69-07201

INTERSTATE COMM'N ON THE POTOMAC RIVER BASIN.
W Va Code Ann, secs 29-1c-1 thru 29-1c-5 (1966).

Descriptors: *West Virginia, *Pollution abatement, *Interstate compacts, *River basin comm'ns, Interstate rivers, Legislation, Pennsylvania, District of Columbia, Maryland, Virginia, Programs, Quality control, Sewage treatment, State governments, Federal government, State jurisdiction.
Identifiers: *Potomac River.

A commission of three members is created to act with commissioners appointed from Pennsylvania, Virginia, Maryland, and the District of Columbia together constituting the 'interstate commission on the Potomac River Basin.' A compact among the member states for the control of pollution is set out. The commission shall have power to: (a) collect data pertaining to pollution; (b) cooperate with other groups and agencies to promote uniform pollution laws; (c) disseminate public information in relation to stream pollution; (d) cooperate with other groups and agencies to formulate programs relating to stream pollution; (e) to comment upon plans of other groups and agencies; (f) recommend minimum standards for sewage treatment and establish water quality standards. Neither the governor nor any member of the commission shall consent to the construction of any dam within or without the state which shall flood lands in the state without the express consent of the legislature. (Kahle-Fla)
W69-07213

PERMITS AND POLLUTION CONTROL.

W Va Code Ann sec 20-5A-5 through 20-5A-8 (1966), as amended, (Supp 1968).

Descriptors: *West Virginia, *Permits, *Sewage disposal, *Water pollution control, Administrative agencies, Industrial wastes, Legislation, Municipal wastes, Sewage treatment, Waste disposal, Sanitary engineering, Pollution abatement, Water treatment, Operation and maintenance, Public health.

It is unlawful for any person to effect any substantial change in the character of sewage disposal from any industrial or commercial establishment without first obtaining a permit from the department of natural resources. All permit applications for activities relating to sewage should be submitted to the Division of Sanitary Engineering. The application should include a plan of proposed maintenance and operation. The Director of the Division of Sanitary Engineering shall determine the health aspects and then refuse or grant the permit. If approved, the permit and application should be forwarded to the division of water resources for final approval. After issuance of a permit, the chief, or his representatives, may periodically inspect the facilities to make sure there is no pollution. The chief can compel compliance with the terms and conditions in the permit by revoking or suspending the permit until such terms are complied with. (Stewart-Fla)
W69-07218

DEPARTMENT OF HEALTH.
Minn Stat Ann secs 144.01 to 144.03, 144.11 to 144.145, 144.35 to 144.37 (1946), as amended, (Supp 1968).

Descriptors: *Minnesota, *Supervisory control (Power), *Public health, *Water pollution, Fluoridation, Diseases, Environmental sanitation, Permits, Sewage disposal, Recreation, Safety, Sanitary engineering, Water purification, State governments, Administrative agencies, Regulation, Streams, Wells, Springs, Water pollution control, Legal aspects, Water supply, Legislation.

The Department of Health is continued under the supervision and control of the State Board of Health. The Board may make rules and regulations necessary to carry out its purposes. It shall enforce reasonable regulations for the preservation of the public health, and upon approval of the attorney general and after publication, such regulations have the force of law. The Board may control sewage disposal, water pollution, and the general

anitation of hotels and resorts by licensing and other means. The Board shall promulgate rules and egulations relating to the fluoridation of public vater supplies. The Board shall have charge of all vatercourses used for the discharge of sewage or other matter and shall take all appropriate meaures to insure that the public health is not endangered therefrom. The Board may order anyone polluting watercourses within the state to desist from uch activity. Persons may appeal from any order ssued by the Board. (Helwig-Fla)
W69-07228

PASSAIC VALLEY SEWERAGE DISTRICT.
N J Stat Ann secs 58:14-7, 58:14-8, 58:14-9 1966), as amended, (Supp 1968).

Descriptors: *New Jersey, *Water pollution control, *Sewage, Administrative agencies, Legislation, Jurisdiction, Rivers, Tributaries, Sewers, Water law, Municipal wastes, Cities, Regulation, Water pollution sources, Sewage disposal, Pollution abatement, Odor, Gases, Local governments, Construction, Planning, Legal aspects.
Identifiers: Putrefaction.

The Passaic Valley Sewage commissioners are given the power to enforce provisions prohibiting he discharge of sewage or other polluting matter nto the Passaic River between the Great Falls and Newark Bay by instituting the necessary civil actions in superior court. This court is vested with jurisdiction to enforce these provisions. The act also rovides that no sewage, waste matter, or other ubstance which creates odors, gases, or fumes due o the putrefaction of organic matter may be umped into the Passaic River or its tributaries etween the points mentioned above. Whoever violates this provision, with the exception of a municipal corporation, shall be subjected to a penalty f one hundred dollars plus twenty five dollars for ach day the condition remains unabated. The overning bodies of the municipalities may request he commissioners to submit plans for the construction of a trunk line or main intercepting sewer to omply with the mandates of this act. (Holt-Fla)
W69-07238

TEXAS CO V MONTGOMERY (POLLUTION CONTROL BY STATE AGENCIES).
3 F Supp 527-536 (E D La 1947).

Descriptors: *Louisiana, *Bayous, *Water pollution control, *Administrative agencies, Brine isposal, Well regulations, State governments, treams, Lakes, Legislation, Judicial decisions, egal aspects, Wildlife, Oysters, Federal jurisdiction, Water pollution sources, Water pollution reatment, Oil industry, Oil fields, Oil wastes, Coastal marshes, Gulf of Mexico.
Identifiers: Delegation doctrine.

The Texas Company brought a bill in equity to ave a state statute creating the Louisiana Stream Control Commission declared void as violative of he Fourteenth Amendment to the Federal Constitution and as violative of certain articles of the Louisiana constitution. The Commission would ontrol waste disposal of an 'unreasonable' nature nto the lakes, streams, rivers and coastal waters of he state. Plaintiff contended that the statute was oid on its face since the act failed to set forth an scertainable standard of pollution to guide the Commission in the exercise of the delegated owers. The court recognized the need for a flexile definition of pollution due to varying water conitions and circumstances and refused to invalidate he statute for vagueness. The plaintiff's contention hat the act was invalid in that it delegated unmited authority to the Commission was denied. The court pointed out that only 'unreasonable polution' could be regulated by the Commission. Finally, the court declared that the provisions in he act requiring a public hearing prior to the isuance of any Commission directive preserving the ight to appellate review of Commission orders were sufficient to satisfy the due process requirements of the 14th Amendment to the Federal Constitution. The court declined to pass on possible violations of the state constitution, stating that such issue was not properly before the court for determination. (Katz-Fla)
W69-07253

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

THE DEVELOPMENT OF A MODEL TO EVALUATE HYDROLOGIC RISK IN A WATER RESOURCES SYSTEM,
Battelle Memorial Inst., Richland, Wash., and Texas A and M Univ., College Station.
William L. Bathke, and R. J. Freund.
Water Resources Bull, Vol 5, No 1, pp 53-61, Mar 1969. 9 p, 3 fig, 15 ref.

Descriptors: *Mathematical models, *Risks, *Systems analysis, *Synthetic hydrology, Optimization, Water resources development, Estimating, Streamflow forecasting, Water supply, Cost-benefit analysis, Operations research.
Identifiers: Water resource system risks.

A technique is described for analyzing a water resource system whose inflow is highly variable. The use of this technique requires not only that a mathematical model be developed of the physical, hydrological, and economic characteristics of the water resource system under study, but also that the economic benefits of the system, including full and partial water deliveries for irrigation development, be evaluated. Although developed independently of and simultaneously with the recently advanced concepts known in part as 'operational hydrology,' the technique described in this article includes some significant departures, such as the development of a complex revenue-loss function and water-shortage statistical characteristics for various reservoir sizes.
W69-07100

RULES FOR ORDERING UNCERTAIN PROSPECTS,
Case Western Reserve Univ., Cleveland, Ohio; and Kentucky Univ., Lexington.
Josef Hadar, and William R. Russell.
AER, Vol 59, No 1, pp 25-34, March 1969. 10 p, 8 ref.

Descriptors: *Average, Probability, Risks, Forecasting, Marginal utility.
Identifiers: *Orderability, *Uncertain prospects, *Utility function, *Variance, *Preference, Probability distribution, Quadratic utility function.

In many theoretical as well as practical situations one is frequently confronted with the necessity of making a prediction about a decision maker's preference between given pairs of uncertain alternatives without having any knowledge of the decision maker's utility function. The usual approach to this problem involves comparisons of means and variances of the probability distribution in question. However, rules of comparison involving only two moments are valid only for limited classes of utility functions, or for special distributions. Except for such special cases as the quadratic utility function, the specification of distributions in terms of their moments is not likely to yield strong results, essentially because information about the moments cannot be utilized efficiently for the purpose of ordering uncertain prospects when the utility function is unknown. In this paper the authors propose two rules which are more powerful than the 'moment method.' Under the stronger of these rules, distributions may be ordered according to preference, given any utility function, while under the weaker rule orderability obtains for any utility function which exhibits nonincreasing marginal utility everywhere. Water is often a product containing significant components of uncertainty in both its supply and demand functions, and this article extends the theoretical treatment of the role of uncertainty in utility analysis and has relevance to both water demand and supply analyses. (Loeb-Rutgers)
W69-07160

INTERREGIONAL FEEDBACKS IN INPUT-OUTPUT MODELS: SOME EXPERIMENTAL RESULTS,
Pennsylvania Univ., Philadelphia.
Ronald E. Miller.
Western Economic Journal, Vol 7, No 1, pp 41-50, March 1969. 10 p, 6 tab, 16 ref, 1 append.

Descriptors: *Input-output analysis, Leontief models, Regional analysis.
Identifiers: *Interregional feedback, Error, Interregional linkage, output, Percentage error.

Studies attempting to measure the impact on a particular region of exogenous changes in the demand for products of that region have frequently employed a regional input-output framework. In these models, linkage to the outside is usually expressed in an export column and an import row. More ambitions interregional models attempt to treat two or more regions with equal detail, specifying a complete input output matrix for each; in addition, flows in each direction between regions, by sector, are recorded in interregional matrices. The time, effort, and expense involved in collecting data frequently prohibit construction of an input-output coefficient matrix for a particular region. It is even more difficult to derive trade coefficient matrices between regions. Thus, a complete interregional framework has seldom been operational. Therefore, interregional feedback effects are usually lost in regional analyses. This paper presents the results of investigation into the question: how large are the interregional feedbacks likely to be in typical situations. Specifically, how much error results from ignoring interregional linkages and determining a region's gross outputs with only a single-region, intraregional model. This analysis would be of relevance to water research since significant research has recently been conducted in designing input-output models for water, especially in the Western states. (Loeb-Rutgers)
W69-07161

ON THE RELATIONSHIP AMONG DIFFERENT MEMBERS OF THE K-CLASS,
Washington Univ., Seattle.
Walter Y. Oi.
International Economic Review, Vol 10, No 1, pp 36-46, February 1969. 11 p, 13 ref.

Descriptors: Least squares method, Regression analysis, Dispersion.
Identifiers: *K-class method, *Ordinary least squares, *Two-stage least squares, Limited information, Reduced-form residuals, Specification errors, Collinearity.

The K-class can be viewed as a general estimation method which includes ordinary least squares, two-stage least squares, and limited information as particular members. This paper presents an alternative derivation of the K-class method in which least squares is applied to a structural equation after suitable transformations have been applied to the jointly dependent variables. Different members of the k-class (differing in their posited values of K) correspond to different transformations of measured reduced-form residuals. The relationships among parameter estimates of different K-class members are then revealed by the analysis of specification errors. These relationships take the form of mathematical identities. The conditions under which dispersion among different members of the k-class is a minimum are examined. It can be shown that the k-class estimators are weighted averages of the ordinary least squares and two-stage least squares estimators. Stochastic estima-

tion techniques have increasingly been applied to water research problems. In particular, water demand and market studies often utilize regression and correlation methods. This article generalizes estimation methods for the water researcher and in the context of K-class estimation procedures. (Loeb-Rutgers)
W69-07163

EFFICIENT ESTIMATION OF DISTRIBUTED LAGS WITH AUTOCORRELATED ERRORS,
Pennsylvania Univ., Philadelphia.
Phoebus J. Dhrymes.
International Economic Review, Vol 10, No 1, pp 47-67, February 1969. 21 p, 1 tab, 11 ref, 1 append.

Descriptors: *Estimating, Markov processes.
Identifiers: *Estimation, *Distributed lag, *Autocorrelated errors, *Maximum likelihood estimators, *Likelihood function, Koyck's scheme, Lag structure, Consistency.

In this paper an expression for the estimators of the parameters of an infinite (Geometric) lag structure model which globally maximized the likelihood fuction is given. It is shown that such estimators are consistent, asymptotically unbiased and efficient. It was assumed that the error term of the model is a first order Markov process. Although this is somewhat restrictive, it is often found appropriate in econometric work. If this is indeed so, the author concludes that it would seem that the procedure herein described, which can be easily executed on a standard regression (Computer) program is to be preferred to others which approximate (Linearly) the likelihood function and employ a two step procedure. Empirical water demand and flow simulation studies may make use of distributed lag terms in the estimated equations of the model. This article has relevance to statistical water research by developing an efficient estimating technique for distributed lag structures. (Loeb-Rutgers)
W69-07164

LONG-RUN LINEARITY, LOCALLY GAUSSIAN PROCESS, H-SPECTRA AND INFINITE VARIANCES,
International Business Machine Corp., New York.
Benoit Mandelbrot.
International Economic Review, Vol 10, No 1, pp 82-111, February 1969. 30 p, 9 fig, 36 ref.

Descriptors: Frequency, Time series analysis, Statistical methods, Stochastic processes.
Identifiers: *Long-run linearity, *Locally Gaussian process, *H-spectra, *Infinite variance, *Econometrics, *High frequency effects, *Low frequency effects.

This paper describes the four concepts in the title of the article first separately and then through their interactions. The 'H-spectrum hypothesis' and the 'infinite variance hypothesis' are divergence hypotheses introduced to account for the main erratia aspects in the behavior of economic time series. Next to be studied are 'long-run linearity' and 'locally Gaussian processes,' which are new models added to econometrics. Most economic time series do not fulfill the independent Gaussian ideal of simplicity, even after possible gross nonstationarity has been eliminated by differencing. For analysis, discrepancies from independent Gaussian processes can be divided into two classes. The first includes 'high frequency effects,' to which the bulk of econometrics has so far been devoted. The second includes 'low frequency effects,' with which the present work is concerned. Two 'low frequency syndromes' of economics are described and are shown to be incompatible within the framework of the usual econometric models. A generalized model is constructed which allows for both syndromes. The investigation of time series problems by this article make it relevant to water simulation and flow studies and also to water demand analyses using time series data. (Loeb-Rutgers)
W69-07166

A FAMILY OF FUNCTIONAL ITERATIONS AND THE SOLUTION OF MAXIMUM LIKELIHOOD ESTIMATING EQUATIONS,
California Univ., Davis; and New South Wales Univ., Kensington (Australia).
Leon L. Wegge.
Econometrica, Vol 37, No 1, pp 122-130, January 1969. 9 p, 1 fig, 7 ref.

Descriptors: Regression analysis.
Identifiers: *Iteration, *Maximum likelihood, *Newton-Raphson method, *Gradient method, Convergence, Partial derivative, Likelihood function, Jacobian, FIML.

The two classical methods of finding a solution of a nonlinear system of equations are gradient methods and the Newton-Raphson method. The two methods are usually combined in such a way that the computational effort required is made as small as possible. In practice, the iterations are started with the gradient method until a point is reached that falls inside the region of convergence of the Newton-Raphson method. From there on, the iterations are continued with the Newton-Raphson method, not only because of its higher speed of convergence as compared to gradient methods, but also because in the end the partial derivatives have to be derived anyway in order to check for the second order conditions and/or to derive the covariance matrix of the estimates. The method proposed here provides an alternative to the Newton-Raphson method. Its main advantage lies in the fact that the functional form of the partial derivatives almost never has to be derived. Technically speaking, the iteration formula considered here is the same as the Newton-Raphson formula, except that the partial derivatives are replaced by suitably chosen approximations. This article could be helpful to the water researcher using such econometric methods, especially when investigating a highly nonlinear system of equations. (Loeb-Rutgers)
W69-07170

6B. Evaluation Process

URBAN ENVIRONMENTAL PROBLEMS: WHAT ARE WE LEARNING FROM ECONOMIC STUDIES OF WATER QUALITY,
Florida Univ., Gainesville. Water Resources Research Center.
Allen V. Kneese.
Engineering Progress, University of Florida, Vol XXI, No 6, Bulletin No 128, pp 5-18, June 1967. 13 p, 12 ref.

Descriptors: *Economics, *Water quality control, Control systems, Institutions, Theoretical analysis, Decision making, Costs, Damages.
Identifiers: *Research, Qualitative analysis.

There are four categories of important economic studies of water quality which are completed or in progress: (1) conceptual and methodological studies; (2) empirical evaluation studies; (3) studies of control systems; and (4) studies bearing upon desirable institutional change. Examples clarify the discussion of the first three categories. The concept and methodology of economic studies of water quality come from welfare economics. Empirical evaluation studies are concerned with: (1) the willingness of decision units to pay for the avoidance of damages; and (2) the cost to decision units that reduce external costs. Situations which require environmental control systems incorporating large-scale measures are described. Conclusions are: (1) Techniques for controlling water quality must result from analysis of values, contrary to the usual approach which is still focused on physical effects and objectives. Research in the economic values associated with water quality management has made significant progress, but has barely begun to illuminate many difficult problems; (2) Even carefully determined value-based rules governing decisions often cannot achieve optimal environmental quality management; more direct and explicit collective action on a regional scale is often indicated; (3) We are ill-equipped institutionally to implement those management systems and procedures which economic and engineering analysis suggests; appropriate research has hardly begun. (Gossen-Chicago)
W69-06841

URBAN ENVIRONMENTAL PROBLEMS: ROLE OF THE FEDERAL GOVERNMENT,
Florida Univ., Gainesville. Water Resources Research Center.
For primary bibliographic entry see Field 6E.
W69-06842

PROSPECTUS: WATERSHED PLANNING PROGRAM FOR BUFFALO AND MCDONALD CREEKS.
Harza Engineering Co., Chicago, Ill.

Harza Engineering Company, March 1968. 51 p, 2 fig, 2 map, 10 photo, 5 tab.

Descriptors: *Drainage programs, *Flood plain zoning, *Water quality control, *Aquifers, Water supply, Planning, Inter-agency cooperation, Costs, Scheduling, Financing, Illinois.
Identifiers: Buffalo Creek Watershed, McDonald Creek Watershed.

The report examines the Buffalo Creek and McDonald Creek Watersheds in terms of geography, geology and soils, hydrology, and urbanization. It reveals an urgent need for the preparation of a coordinated drainage plan for the entire area of both watersheds. Associated needs are: maintaining the open space necessary for flood plain management improving water quality, and raising aquifer water levels. The report proposes a planning study which: quantitatively defines the functional relationships in the watershed; simulates operation of natural stream channels and water control facilities; and tests the effects of different courses of action. All planning and implementation processes would require close cooperation among governmental units concerned. A Watershed Committee with representatives from principal governmental units of the watershed is recommended and charged with sponsoring the planning program. Its structure and its need for technical assistance are discussed. Steps of the program are discussed. An estimated study schedule is 18 months. Estimated cost is $69,000. Alternative means of financing are: by a Department of Housing and Urban Development grant; by the Metropolitan Sanitary District of Greater Chicago; by the State of Illinois; and by local governments. (Gossen-Chicago)
W69-06849

ATTITUDES OF LOCAL RESIDENTS TOWARD WATERSHED DEVELOPMENT,
Mississippi State Univ., State College. Social Science Research Center.
Satadal Dasgupta.
Mississippi State University, Social Science Research Center, Preliminary Report 18, May 1967. 30 p, 20 tab, 6 ref, 1 append.

Descriptors: *Attitudes, River basin development, Local governments, Projects, Community development.

The general objective of the study was to delineate factors which affect the attitudes of local landowners toward watershed development programs. Attitudes were analyzed at two levels: individual and community. Two similar communities, in which similar watershed projects were already underway, were selected for study. In analysis at the individual level, four status-variables were related to attitudes toward watershed development: organizational involvement; occupation; education; and level of living. An index (IPW), composed of the variables, had a stronger relation to attitudes than each variable singly. Two situational variables were related: degree of technical contact; and participation in planning. Knowledge of watershed development represented an intervening variable both in the relationship between the IPW and at-

tudes and in the relationship between situational ariables and attitudes. Community A included a reater proportion than Community B of persons ith high organizational involvement, non-farm occupations, high education, high level of living, high W scores, and experience of flood damage. The ndings suggest that Communities A and B differed degree of favorability because they had different roportions of landowners with knowledge of atershed development. (Gossen-Chicago)
69-06850

HE PROGRAM FOR WATER MANAGEMENT.
lorth Central Texas Council of Governments.

lorth Central Texas Council of Governments, unated (mimeo). 15 p, 1 tab.

escriptors: *Watershed management, *Programs, ater supply, Water quality control, Flood conol, Water allocation (Policy), Sewerage, rainage systems, Long-term planning, Short-term lanning, Costs, Financing.
lentifiers: Inter-community water supply, Interommunity water quality control, Inter-community rainage systems, Inter-basin water supply, Water ecycling.

bjectives of the program are: to develop a reional planning-and-development programming stem which will insure the availability of an dequate water supply for the North Central Texas egion; attainment and maintenance of desirable ater quality standards; mitigation of flood roblems; and development and maintenance of dequate water distribution, sewerage, and rainage systems. The program considers interasin water supply relationships; water supply, uality control and drainage among communities; nd intra-community distribution of water and colction and treatment of sewerage. The expected ork program is described in sequence from ebruary, 1968 to June, 1969. A table shows the evelopment of work from the first steps, which are lentification of sewerage system areas, water stem areas, and drainage system areas, to the last eps, which include demonstrations of sewerage stems, of water recycling, and of drainage stems, a watershed demonstration, and a continug planning program. Intermediate activities inude evaluation of existing systems and of the lan's adequacy, designing a regional water quality onitoring system, establishing a flood damage ratg system, and developing short-range, and inrim plans. Outputs of the program will be applied the areas of water management policy and of a mprehensive regional information system. Costs, nding, and supervision are discussed. (Gossenhicago)
69-06851

OCIOLOGICAL AND SOCIAL PSYCHOLOGIAL FACTORS RELATED TO ETROPOLITAN WATER RESOURCES EVELOPMENT,
tah State Univ., Logan.
Vade H. Andrews.
stitute for Social Science Research on Natural esources; Institute Series: Special Paper No 2, ovember 1968. 7 p.

escriptors: *Water resources management, Water resources development, Social values, sychological aspects, Water demand.
lentifiers: *Social psychology, *Interdisciplinary esearch, Social organization, Social action, Diffuon of ideas, Sociological methodology.

he problem of interdisciplinary work is discussed ith stress placed upon the problems of communiation between the various fields due to differing rgons of expression; problems of different ethodologies or approaches to problems; difrent levels of development regarding methodolo; and, widespread specialization within individual elds. The remainder of the article deals with spects of social psychology and sociology which are related to water problems. The aspects considered include values, social organization, social action, the process of diffusion of ideas and research methodology. Emphasis is placed on the very small amount of research being conducted on sociological aspects of water resources development. Six such research projects are briefly described. (Davis-Chicago)
W69-06853

TOWARD THE SOCIOLOGICAL ANALYSIS ON NATURAL RESOURCES AND SOCIETY,
Utah State Univ., Logan.
Wade H. Andrews.
Institute for Social Science Research on Natural Resources; Institute Series: Special Paper No 1, September 1968. 12 p, 34 ref.

Descriptors: *Natural resources, *Pollution abatement, *Water resources, Land resources, Wildlife, Motivation, Attitudes.
Identifiers: *Sociology, Social problems, Social structure, Resource use, Mineral resources.

Natural Resources provide a new direction for sociological research based on the social systems, patterns of behavior, motivation, values and attitudinal aspects associated with and structures around natural resources. The need to pursue these studies was based on the following assumptions regarding the importance of natural resources: (1) population growth is increasing the demand upon natural resources; (2) there is a finite limit to resources; (3) certain resources are irreplaceable; (4) a growing sense of aesthetics; (5) pollution must be controlled; (6) order in development is necessary for future well-being; and, (7) planning is the basis for this order. This sociological study of natural resources can be approached from four viewpoints: (1) the resource itself as a point of departure; (2) a stress on the uses of resource; (3) the identification of social problems related to resources; (4) the relationship of resources to social structure. These topics are then discussed in regard to a typology of resources. This typology includes: water resources; land resources; mineral resources; forestry and wilderness; wild life; and, the special problem of resource pollution. (Davis-Chicago)
W69-06854

THE RELATION OF WATER RESOURCES TO THE INDUSTRIAL AND RECREATIONAL POTENTIAL OF THE MISSISSIPPI GULF COAST,
Mississippi State Univ., State College. Water Resources Research Inst.
A. A. Armenakis, R. F. Pearson, and W. P. Neely.
Water Resources Research Institute, Mississippi State University, 1968. 186 pp, 6 fig, 8 map, 44 tab, 128 ref, 2 append.

Descriptors: *Water resources, *Mississippi, Water quality, Industries, Training, Industrial wastes, Transportation, Water resources development, Recreation facilities, Recreation demand, Human population, Average income, Education, Economic life, Utilities, Communication, Natural resources, Climatic data, Topography, Drainage, Geology, Hydrology, Groundwater, Surface waters, Legal aspects.
Identifiers: *Industrial potential, *Recreational potential, Jackson County (Miss), Harrison County (Miss), Hancock County (Miss), Industrial distribution, Industrial facilities.

After outlining the purpose, scope, and methodology of the study, the report surveys the characteristics of the study area, which includes Jackson, Harrison, and Hancock Counties in Mississippi. Characteristics discussed are: population breakdown, population trends, income per capita, race breakdown, education breakdown, present and planned housing, economic development, utilities, governmental structure, communications, location, natural resources, non-water transportation, climate, topography and drainage, and geology and hydrology. Chapter III discusses fresh water resources of each county, problems in quality of surface water and groundwater. Chemical analyses of surface and groundwaters, and legal restrictions concerning stream pollution. Chapter IV discusses industrial distribution, industrial facilities and industries of each county, vocational education, and the gulf coast fishing industry. Chapter V discusses present industrial water consumption, projected future demand, and industrial pollution. Chapter VI analyzes major water-using industries from a mail questionnaire and follow-ups. Chapter VII discusses salt water transportation. Chapter VIII studies proposed developments of water resources in each county. Chapter IX discusses recreational facilities of the Mississippi Gulf Coast. It covers the national demand for recreation, assets of the Mississippi coast, and several proposed and existing facilities. Chapter X studies the industrial and recreational potential of the Mississippi Gulf Coast. (Gossen-Chicago)
W69-06857

WORKSHOP ON WATER RESOURCE PROBLEMS AND RESEARCH NEEDS RELATED TO AGRICULTURE IN THE COASTAL PLAINS OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Water Resources Research Inst.
For primary bibliographic entry see Field 03F.
W69-06945

ECONOMIC EVALUATION OF A WATER RESOURCES DEVELOPMENT PROJECT IN A DEVELOPING NATION,
California Univ., Berkeley. Hydraulic Engineering Lab.
Fereidoun Mobasheri.
Calif Univ Water Resources Center Contrib No 126, July 1968. 191 p, 14 fig, 30 tab, 79 ref, 2 append. OWRR Proj No A-003-CAL and B-041-CAL.

Descriptors: *Water resources development, *Economic justification, *Economics, Cost-benefit analysis, Social values, Social needs, Labor supply, Water supply, Engineering structures, Engineering estimates, Irrigation, Crops, Hydroelectric power, Aquifers, Planning.
Identifiers: *Developing nation, Economic evaluation.

This study presents a detailed economic evaluation of water resources in any developing nation on the basis of experience obtained in conducting water resources surveys and water control in the developed nations. The monograph discusses the following: some characteristics of developing nations and the aims of economic planning; approaches for economic evaluation of public investment projects; the concept of benefit-cost analysis and need for its modification; modification of benefit-cost analysis, synthesis of a new criterion; and optimum design of a multiple purpose water resources project. It is concluded that whenever investment in a water project is considered, questions such as what is the economic value, what is the optimal scale of development, and what is the economic rating of the project, among alternative projects, should be answered. A sensitivity analysis is summarized and considers the annual rate of GNP growth, balance of payments equilibrium, and underemployment of unskilled labor force. (Gabriel-USGS)
W69-06981

REGIONAL DEVELOPMENT AND THE RURAL POOR,
Kentucky Univ., Lexington.
Niles M. Hansen.
The Journal of Human Resources, Vol 4, No 2, pp 205-214, Spring 1969. 10 p, 1 tab, 15 ref.

Descriptors: *Industries, *Migration, *Unemployment, *Human resources, *Costs, government, Rural areas, Investment, Taxes, Area development, Wages, Priorities.

Identifiers: *Poverty, *Social costs, *Federal programs, Opportunity costs, Subsidies, Tertiary sector, External economics.

The regional policy of the President's advisory Commission on Rural Poverty is based on the assumption that the social costs of bringing industry to relatively poor regions would be less than the social costs involved in the migration of workers and increased congestion and unemployment in industrial areas. This presents a problem for water resource development in previously unindustrialized areas. Federal programs to influence the quality of human resources in lagging rural areas benefit the people of these regions and the nation as a whole. Opportunity cost considerations favor federal subsidies for investment in education, health, and training in lagging regions, as well as for relocation subsidies and information programs to facilitate rational migration towards intermediate regions where growth is rapid but where congestion poses no immediate threat. Recently, some research has pointed out the potential income redistribution effects of water projects. The possible income effects on rural poverty areas generated by water developments makes this article relevant to the regional planner. (Murphy-Rutgers)
W69-07155

PERPLEXING PROBLEMS IN DECISION THEORY,
Massachusetts Inst. of Tech., Cambridge.
Billy E. Goetz.
The Engineering Economist Vol 14, No 3, pp 129-140, Spring 1969. pp 12, ref 8.

Descriptors: *Dynamic mathematical model, *Decision making, *Priorities, Discount rate, Overhead cost.
Identifiers: *Quantitative models, *Decision models, *Utility transforms, *Aggregation level, *Algorithmic solution, Periodic reports, Hypothesis, Total net cash flow.

An objective of this article was to present arguments important to potential research projects. In sequence, these points included determining the scope of the problems, and in what order they should be treated. Hypotheses should then be created and selected, hopefully to incorporate risk into decision making models and to determine aggregation levels for such items as cash flow, increments, overhead costs, and time horizon. A dynamic model of the system under study is suggested, with an integrated view resulting from a quantitative model that is subject to algorithmic solution. This method might help to systematize research and lessen intuition, and would therefore be helpful to the water researcher. (Murphy-Rutgers)
W69-07156

UTILITY AS A SURROGATE FOR VALUE IN WATER RESOURCES ANALYSIS,
Rutgers - The State Univ., New Brunswick, N. J.
William Whipple, Jr.
The Engineering Economist Vol 14, No 3, pp 159-167, Spring 1969. pp 9, ref 9.

Descriptors: *Water-resource development, *Water pollution control, *Systems analysis, *Decision making, Optimization, National income.
Identifiers: *Utility benefit approach, *Intangible aspects, *Utility analysis, *Net utility advantage, Net output, Water resources system, Minimization of cost.

This article proposes a utility benefit approach to water-resource development to maximize net output of goods and services in view of the constraints imposed by intangible aspects. The utility approach would permit a determination of the national effect of water-pollution control, and would facilitate systems analysis of water-resources systems to aid pollution control. Utility benefit analysis should be applied in this area, since its analytical advantages result is a series of alternatives evaluated in utility terms including the intangibles involved. Any evaluation of these intangibles should be opinion, since the matter is not subject to objective determination. A systems analysis of these intangibles presents difficulties, which can be avoided by confining the analytical process to minimizing the cost of achieving an objective decided upon based on the intangibles. This alternative does not evaluate national income and product in relation to the proposal, and thus the utility analysis has the greatest probability of increasing national welfare, when balanced against intangible effects. (Murphy-Rutgers)
W69-07158

ECONOMIC ASPECTS OF WATER RESOURCE POLICY,
Wisconsin Univ., Milwaukee.
Mason Gaffney.
The American Journal of Economics and Sociology, Vol 28, No 2, pp 131-144, April 1969. 14 p

Descriptors: *California, *Water policy, *Water resources, *Water development, *Irrigation districts, *Marginal costs, *Capital, *Aquifers, *Irrigation, *Water rights, *Riparian doctrine of water rights, Storage, Drainage, Motivation, Political aspects.
Identifiers: *Pooling, *Community action, *Diminishing returns, *Water systems, Compactness, River development, Spillover benefits, Rationing.

A description is given of what the author has learned from the experience of the Western States in economizing on water for the purpose of aiding eastern researchers. The need for community action in the area of water resources is pointed out with a discussion of the benefits of the irrigation districts originating in California. State action is also needed, primarily in the area of defining property rights in water. It is necessary for the federal government to define interstate water property questions and it should redirect its own priorities in the water resources area. With water becoming increasingly scarce and riparian doctrine of water rights is unsatisfactory and the reasons necessitating its abandonment are presented. Likewise, the reasons for the failure of the appropriative doctrine of water rights are discussed. There has been a failure to economize on rent-bearing waters which results in the wasting of local waters adding to the already highly expensive conveyance and distribution problems. The fact that water evinces diminishing returns suggests several corollaries which are discussed. The acute capital shortage and high interest rates should not stop the necessary water supply investments. (Murphy-Rutgers)
W69-07159

AGGREGATE PRODUCTION FUNCTIONS AND TYPES OF TECHNICAL PROGRESS: A STATISTICAL ANALYSIS,
Brown Univ., Providence, R. I.
Martin J. Beckmann, and Ryuzo Sato.
AER, Vol 59, No 1, pp 88-101, March 1969. 14 p, 6 tabs, 13 ref, 1 append.

Descriptors: Regression analysis, United States, labor, capital.
Identifiers: *Aggregate production function, *Technical progress, CES function, Neutrality, Cobb-Douglas production function, Neutral technical progress, Japan, Germany.

One of the difficulties encountered in estimating the rate and type of technological progress is that of accurate specification of the aggregate production function and the type of technical progress. In recent work the type of production function most commonly applied is the CES function. In this paper the authors examine the case where exogenous forms of technology are assumed. For theoretical and technical convenience, 'neutrality' in the sense of Hicks or Harrod is assumed. Complications arise due to the fact that problems of specification of the form of a production function and the form of technical progress are not independent. The paper discusses the close connection between the form of a production function in general and the type of exogenous technical progress, that would be consistent with a given form of a production function. It is also shown that various new types of 'neutral' technical progress can be meaningfully determined and that the standard definitions of Hicks and Harrod are reclassified in a more general framework. The paper examines some results by presenting statistical evidence on the forms of production functions and on the types of technical progress. A considerable economic literature exists on production function analysis on both theoretical and empirical levels. The analysis of water supply problems via a production function approach is a natural extension of this literature and as such this article treats the problems of introductory technical change into production analysis. (Loeb-Rutgers)
W69-07162

TECHNICAL PROGRESS AND INVESTMENT,
Osaka Univ., (Japan).
Susumu Koizumi.
International Economic Review, Vol 10, No 1, pp 68-81, February 1969. 14 p, 5 fig, 11 ref, 1 append.

Descriptors: *Investment, Capital, Costs, Linear programming, Marginal costs.
Identifiers: *Technical progress, *Acceleration model, *Capital-stock adjustment model, Capital accumulation, Substitutes, Investment decision, Capital-labor ratio.

Recent years have seen many studies, empirical as well as theoretical, on the investment function. Little has been said, however, about the effects of technical progress on investment decisions, whereas nobody would deny the importance of technical progress in the process of capital accumulation. The present paper aims at advancing a theory of investment under a situation in which the type of technical progress taking place is of a form which introduces a new technique to produce an already existing product or a new close substitute thereof. The author presents a theoretical model of investment which incorporates the effects of technical progress. The relation between technical progress and the economic life of capital goods are discussed. The implication of the investment model is clarified and an interpretation of the model as a version of the acceleration model is presented. This is of importance to researchers investigating investment decisions in the water area due to the important role played by technical progress in water resource development. (Loeb-Rutgers)
W69-07165

A NOTE ON DEMAND FOR PUBLIC GOODS,
Social Security Administration, Washington, D. C.
Ronald F. Hoffman.
The Canadian Journal of Economics, Vol 11, No 1, pp 125-120, February 1969. 6 p, 1 fig.

Descriptors: Probability, Competition, Marginal costs, Risks.
Identifiers: *Public goods, *Output consumption, *Externalities, Conflict, Preference, Exclusion principle.

The purpose of this note is to suggest a model of the world of competition, uncertainty, and externalities in output consumption, in which individuals maximize their own self-interest while revealing their preference for public goods. The model offers an explanation of the motive which leads individuals who maximize conflicting self-interest to reveal their preferences for public goods. The author's basic idea is that each individual behaves so as to maximize his expected utility from a proposed incremental public expenditure. The occurrence of the proposed increment is uncertain because it is contingent upon adequate finance; the community must provide payment. Each individual possesses a subjective probability distribution of occurrence; he presumes there is a positive relation between his bid and the associated probability that the offer of

the total community will be sufficient to finance the marginal cost of the increment. The individual reveals his true preference in the form of an offer to share in the cost of the increment. Water projects and their associated benefits often contain significant public-good components. The public good nature of water frequently leads to pricing and benefit measure problems for the developing authorities. This discussion of this article may have some applications in designing benefit and pricing schemes for water development projects. (Loeb-Rutgers)
W69-07167

CONDITIONAL PREDICTION AND UNBIASEDNESS IN STRUCTURAL EQUATIONS,
Massachusetts Inst. of Tech., Cambridge.
Gordon M. Kaufman.
Econometrica, Vol 37, No 1, pp 44-49, January 1969. 6 p, 6 ref.

Descriptors: Forecasting, Least squares method, Regression analysis.
Identifiers: *Conditional prediction, Unbiasedness, Structural equations, Conditional least squares.

Sewell has discussed a generalized version of a problem of conditional least squares estimation treated earlier by Waugh and Srinivasan. The purpose of this note is twofold: first, to give an alternative proof of Sewell's main result that leads to some ancillary facts about conditional least squares estimators; second, to present direct methods for evaluating the normalizing constant of the generalized multivariate t density and for computing the expectation of the random matrix (W) inverse when S is Wishart distributed. The expectation of (W) inverse is needed to compute the covariance matrix of the generalized multivariate t density. The constant mentioned above as well as the expectation of (W) inverse can be derived indirectly by considering a moment generating function. The extension of econometric methodology makes this article relevant to the water researcher concerned with econometric techniques. (Loeb-Rutgers)
W69-07169

ON THE NATURE AND SIGNIFICANCE OF SOCIAL COSTS,
Basel Univ. (Switzerland).
For primary bibliographic entry see Field 06C.
W69-07171

UNEMPLOYMENT, IDLE CAPACITY, AND THE EVALUATION OF PUBLIC EXPENDITURES,
Grinnell Coll., Iowa; and Resources for the Future, Inc., Washington, D. C.
R. H. Haveman, and J. Krutilla.
Baltimore, Maryland, Johns Hopkins Press, 1968. 159 p.

Descriptors: *Water resource development, *Cost-benefit analysis, Unemployment, Costs.
Identifiers: *Public investment criteria, Occupational labor demand, Opportunity costs, Shadow adjustment, Market costs, Primary inputs, Economic capacity, Input-output.

Public expenditure criteria, with assumed full employment, has been increasingly applied to the process of choosing among alternative public expenditures and the process of designing public works projects. If substantial unemployment exists market cost and price data become of little value and a problem of estimating appropriate benefit and cost adjustments for benefit-cost analysis arises. Recently, new sources of data have become available which enable the development of models which trace the final bill for expenditures to the factor sources which supply the primary inputs to public expenditures. These models are presented and implemented. Relationships are developed to estimate the percentage of labor required for the construction of public projects which will be drawn from the idle pool. Industrial output demands and estimates of capacity utilization by industry serve as the basis for developing estimates of the percentage of capital facilities used which were idle. This study, then, evaluates the opportunity cost of public expenditures in periods of less than full employment by analyzing one type-water resource development--among the whole range of public expenditures. (Murphy-Rutgers)
W69-07173

INDUSTRIAL FLOOD LOSSES: DAMAGE ESTIMATION IN THE LEHIGH VALLEY,
Chicago Univ., Ill.
R. W. Kates.
Chicago, Illinois, University of Chicago Press, 1968. 76 p.

Descriptors: *Water resource development, *Optimum development plans, *Delaware River, *Flood damage, River basin development, Industrial production flood proofing.
Identifiers: *Lehigh Valley, *Methodology, *Stage-demand functions, Synthetic estimates, Managerial behavior, Production loss, Factors of production.

This book is an extension of two previously developed lines of research in water-resource management. The first has to do with optimal design of river basin systems. Thus, in the first part the assumptions and procedures that underlie the estimates of damage, that serve as measures of flood control benefits are reviewed. This serves as a benchmark from which to assess the techniques of constructing synthetic damage estimates. Synthetic damage estimates, under alternative assumptions of managerial behavior, had been prepared for commercial and residential land uses for one town. This technique had been extended to other towns differing in physical characteristics of flooding. This line of research was further related to industrial properties in the heavily industrialized Lehigh Valley. Part two reports the result of this research, presented largely in the form of synthetic stage-demand functions for industrial properties under different assumptions of economic evaluation and human adjustment. (Murphy-Rutgers)
W69-07174

POLICY ISSUES AND PROBLEMS IN OUTDOOR RECREATION,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
John C. Frey, and Hays B. Gamble.
Journal of Farm Economics, Vol 49, No 5, pp 1307-1317, December 1967. 11 p, 2 fig, 10 ref.

Descriptors: *Recreation, *Welfare, Recreation demand, Recreation facilities, Pricing, Costs, Taxes, Profit, Supply, Demand, Benefits.
Identifiers: *Policy issues, *Market mechanism, Marginality, Marginal rate of substitution, User charge, Consume, Transportation costs, Consumer preferences.

The primary intent of this paper is to establish a rationale based on economic logic for maximizing efficiency and welfare in outdoor recreation. The authors attempt to show the necessity for a market mechanism in outdoor recreation if resource allocation, firm efficiency, and consumer welfare objectives are to be met. Knowledge of consumer preferences for outdoor recreation is necessary for efficient allocation of resources and may best be achieved through a market pricing system for recreational services. Consumer welfare may be further increased by reducing transportation costs and by locating new outdoor recreation facilities as close as possible to large population centers. In view of current social value judgments plus private capital limitations, there appears to be a strong need for continued public involvement in outdoor recreation. A pricing policy for multipurpose operations may be necessary for efficient allocation of factors in both the public and private outdoor recreation sectors. To accommodate the advantages of institutional control offered by public ownership, plus the desirability of the profit-maximizing objective which accompanies private development, a joint public-private partnership business venture is suggested as an alternative for future expansion of the outdoor recreation industry. The crucial role of water in most outdoor recreation makes this article relevant to the water resources area. (Loeb-Rutgers)
W69-07177

DISCUSSION: POLICY ISSUES AND PROBLEMS IN OUTDOOR RECREATION,
Bureau of Commercial Fisheries, Washington, D. C.
Virgil J. Norton.
Journal of Farm Economics, Vol 49, No 5, pp 1317-1320, December 1967. 4 p, 3 ref.

Descriptors: *Recreation, Welfare, Cost-benefit analysis, Risks, Constraints.
Identifiers: *Policy issues, Pareto optimality, Public policy, Labor mobility, Ignorance.

This paper refers to the previous paper by Frey and Gamble. The author considers the basic public policy question; what type, amount, and share of outdoor recreation services and facilities should the government provide. This question cannot be answered solely within the context of Pareto optimality. Economists doing research in the area of outdoor recreation must be aware that research results are utilized in decisions which result in welfare reallocation. It is important to provide an adequate information base so that all alternatives can be equally considered. To the extent that this has not been done, it is possible that the stage has been set for economic research results to misguide the allocation of outdoor recreation expenditures, not because of incorrect information but simply because of lack of sufficient data, particularly related to certain alternatives. The author suggests that research aimed at developing concepts for measuring recreation values of 'user-type' activities be encouraged. It is suggested that the role of government should be to eliminate constraints, (risks, uncertainty, lack of mobility, and ignorance), rather than to acquire or regulate property for outdoor recreational uses. The important role of water in outdoor recreation usage makes this article relevant to the water researcher. (Loeb-Rutgers)
W69-07178

EXTERNALITIES AND EMPIRICISM IN WATER RESOURCES,
Economic Research Service, Washington, D. C.
Adam A. Sokoloski.
Journal of Farm Economics, Vol 49, No 5, pp 1521-1525, December 1967. 5 p, 2 tab, 9 ref.

Descriptors: *Water resources, Management, Benefits, Oregon, Water quality, Demand, Costs, Fishing, Input-output analysis, Income.
Identifiers: *Externalities, *Empiricism, Group action, Price alteration, Inputs, Outputs, Market interaction, Secondary effects, Yaquina Bay, Engineering measures.

The purpose of this paper is to present one interdisciplinary technique which will supply empirical measures of external effects in water resources and their relation to group action and management. The paper follows the traditional delineation of technological and pecuniary externalities. However, the inclination to exclude the latter as a separate decision element is resisted. In the simplified example, firm A follows a production or consumption pattern which affects firm B, although B has no control over this situation. The effect on B results in price alterations in B's inputs and/or outputs and this in turn will reverberate through activities subsequently involving firm C in its dealings with B. There is the tendency among economists to relegate this interrelationship between B and C to the abyss of 'normal' market interactions. It is argued here that these pecuniary externalities, often referred to as secondary effects, are crucial to management policy. Isolating these effects within market interactions and relating them to the

originating activity in common with the technological interaction will provide crucial assistance in the decision making process if empirical measures can be generated. The externalities usually assigned to 'water production' make this article relevant to the water researcher. (Loeb-Rutgers)
W69-07179

THE TVA TRIBUTARY DEVELOPMENT PROGRAM,
Arkansas Coll., Batesville.
Donald T. Wells.
University, Alabama, University of Alabama Press, 1964. 153 p.

Descriptors: *Tennessee Valley Authority, *Watersheds, *Resource development, Planning, Cost allocation, Benefits, Political aspects, Financing.
Identifiers: *Watershed management, *Watershed financing, *Beech River Authority, Tributary development, Resource mix, Tributary organizations.

The monograph is concerned primarily with the tributary area program of the Tennessee Valley Authority. The first chapter describes the background and development of the program within the TVA. The next chapter deals with the intergovernmental aspect of the watershed program. The monograph then discusses the various patterns of organization in watershed administration. The relationship between planning and watershed development is then examined. The economics of watershed financing are discussed in depth. Various methods of current financing are explained. The experimental methods in the Beech River Watershed are discussed in detail since they represent an attempt to develop a formula for the allocation of cost between the federal government and the Beech River Watershed Development Authority on the basis of estimated benefits. Discussions of inter-agency relationships, state and local politics and democratic control in watershed development follow. (Murphy-Rutgers)
W69-07183

WELFARE ECONOMICS AND SUBSIDY PROGRAMS,
Florida Univ., Gainesville.
Milton Z. Kafoglis.
University of Florida Monographs No 11, University of Florida Press, Gainesville, Florida, pp 1-83, Summer 1961. 83 p, 14 fig, 45 ref.

Descriptors: *Welfare, *Taxes, Income, Social values, Demand, Equilibrium, Pricing, Indirect benefits, Costs, Prices.
Identifiers: *Subsidy program, *Subsidy, *Highway finance, Conflict, Income distribution, Social marginal costs, Collective allocation, Social allocation.

This study attempts to select and apply a body of economic welfare criteria for the financing of those governmental programs which 'subsidize' private economic activity. The chief financial characteristic of such programs is that they rely on revenue derived from both prices and subsidies. Examples may be found in the transportation and public utility industries, the postal service, school programs, health and social insurance programs, programs for the protection and development of infant industry, and many others. In these areas, the subsidy and its corollary, the tax, represent values which the market either overlooks or deliberately rejects. Subsidies are granted and the required taxes are imposed on the assumption that the private or market production and consumption of goods and services will be altered so as to reflect certain social valuations. Subsidies and taxes, therefore, represent a difference between market and social valuation. But such payments cannot be determined efficiently until the unexpressed social magnitudes are at least defined and, if possible, measured. This study attempts to bring together into a systematic framework several strands of economic analysis--price theory, tax theory, and welfare economics. Public subsidy provides the focal point around which the framework is developed and highway finance provides the policy problem to which the framework is applied. Tax and subsidy programs have potentially large roles in water investment and development projects and accordingly this article is relevant to the theoretical evaluation of these programs in water resources problems. (Loeb-Rutgers)
W69-07186

THE MEASUREMENT OF SOCIAL WELFARE,
Northwestern Univ., Evanston.
Jerome Rothenberg.
Englewood Cliffs, New Jersey, Prentice-Hall, Inc, pp 1-357, 1961. 357 p, 19 fig, 8 tab, 284 ref, 6 append.

Descriptors: *Welfare, Value, Compensation, Taste, Marginal utility.
Identifiers: *Social welfare, *General Possibility Theorem, *Compensation principle, Value judgment, Kenneth Arrow, Social welfare function, Economic welfare function.

This book focuses on the question of what the fundamental criterion of social welfare must be in order that a developed welfare analysis can be relevant to guide policy decision. Three characteristics are considered appropriate. First, the standard must be internally consistent. Second, it must enable us to compare a large portion of the policy alternatives before use. Third, it must be compatible with relevant values prevailing in the community. The point of departure of the study is the finding by Arrow that if the standard be fashioned to reflect a particular interpretation of 'rational' evaluation and in addition bear the kind of correspondence to the values of the individuals in the community which we call consumer sovereignty, then the standard will necessarily be internally inconsistent. This book is partly an attempt to see how restrictive Arrow's finding is, and how best to by-pass it so as to form a useful analytic apparatus. Part I sets forth the basic problem and examines Arrow's analysis in detail. Parts II, III, and IV examine a wide variety of approaches in the welfare literature in order to discover how useful are the criteria of choice which they generate. The 'New Welfare Economics,' approaches introducing degrees of cardinality into individual utility indicators, and other approaches resting on specific group uniformities in individual preferences and on group value judgments concerning inter-personal comparability of social welfare impact are analyzed. The public good aspects and social welfare implications of water, water investment and water development projects make the subject matter of this study important to the water research area. (Loeb-Rutgers)
W69-07187

A SURVEY OF WELFARE ECONOMICS,
London School of Economics and Political Science (England).
E. J. Mishan.
Economic Journal, Vol 70, pp 197-265, June 1960. 69 p, 11 fig, 250 ref.

Descriptors: *Welfare economics, *Optimization marginal cost, Prices, Capital.
Identifiers: *Compensation tests, *Community welfare, *Indifference curves, *Welfare criteria, Consumer surplus, Marginal rate of substitution.

The author wishes to present a survey of the developments in the area of welfare economics. He is concerned only with the theoretical aspects and not in the application. Welfare economics involve the ranking of alternative economic situations open to society. Since it is concerned with community welfare it requires several ethical judgments, which are discussed. The author also devotes some time to the kind of methodology needed for such an analysis. The developments of the thirties and then from 1939 on are summarized. A major portion of the article is devoted to the controversy over welfare criteria with particular emphasis given to the contributions of Scitovsky, Little, Pigou, Samuelson and Arrow. The remainder of the article is devoted to the concept of consumer surplus. The author concludes with an evaluation of the inability of welfare economics in its present state to reveal the effects on human happiness of increasing affluence. In terms of the social welfare benefits of water resource development, this article provides a comprehensive summary of the theoretical literature of welfare economics. (Murphy-Rutgers)
W69-07190

BIOLOGICAL AND ECONOMIC ASPECTS OF FISHERIES MANAGEMENT,
Washington Univ., Seattle.
James A. Crutchfield.
College of Fisheries and the Department of Economics of the University of Washington at Seattle, February 17-19, 1959. 160 p.

Descriptors: *Foreign trade, *Fish management, *Fisheries.
Identifiers: *Management, *Political limitations, *Sociological limitations, *Economics in fishery management, Biology in fishery management, Halibut fisheries.

The book presents articles by different authors under several main headings. The first main section is on the biological and economic aspects of fishery management. This contains articles on management techniques available to fisheries management, biology and economics in fishery management, and the political and sociological limitations of fishery management. The second section deals with halibut fishery management and contains articles on management practices, economic effects of regulation, and the limitations of management. The third section deals with salmon management in Alaska with articles on the management and financial problems and the economic effects of regulation. The last section contains articles on international trade policies and their relation to fisheries. The articles within the section deal with the effect of trade on U.S. fisheries, recent developments in fishery methods and the effects of technological developments on the fishery industry. Since it is concerned with an important area of water resource planning this book should be a helpful reference to those working in the area. (Murphy-Rutgers)
W69-07191

ECONOMIC EFFECTS OF REGULATION OF THE PACIFIC HALIBUT FISHERY,
F. Heward Bell.
In Biological and Economic Aspects of Fisheries Management, College of Fisheries and the Department of Economics of the University of Washington at Seattle, pp 51-75, February 17-19, 1959. 75 p, fig 7, tab 6, ref 27.

Descriptors: *Prices, *Competition, *Fishery, *Management, *Regulation, Indirect costs, Capital, Population, Conservation.
Identifiers: *Production, *Yields, *Markets, Input-output ratio, Marine resources.

The article presents an answer to those economist who have claimed the management of the Pacific halibut fishery by the International Pacific Halibut Commission to be an economic failure. The gains in output by the regulated fishery are listed. The author answers the main criticisms of fishery management dealing mainly with the socioeconomic objections, questions relating to the type of markets in which the fish were disposed of and gives a lengthy discussion of the results of previous economic studies of the Fishery. The predictable and increasing production of the fishery provides a stabilizing element to the fluctuating Northwest fishing industry, thus benefiting the general regional economy. The joint regulation of the halibut fishery has been a highly successful experiment in management of an important water resource area bringing wealth, employment and food for the people of both Canada and the United States. (Murphy-Rutgers)

/69-07192

NTERNATIONAL TRADE AND ITS EFFECT ON UNITED STATES FISHERIES,
Harold F. Cary.
n Biological and Economic Aspects of Fisheries Management, College of Fisheries and the Department of Economics of the University of Washington at Seattle, pp 130-141, February 17-19, 1959. 2 p, tab 4.

Descriptors: *Foreign trade, *Fisheries, *Imports, Exports, Tuna.
Identifiers: *Trade policies, Trade objectives, Subsidies, Consumers, Processors, Distributors.

The article explores the effects of international trade and trade policies upon the food fisheries. For the previous decade the domestic catch of food fish has declined almost twenty per cent. At the same time imports of fresh and frozen food fish have increased about one hundred and one per cent and that of canned and similarly processed fish by nearly fifty-eight per cent. The author gives a brief outline of the United States trade policy over the last quarter century. The tariff arguments currently in force are discussed, with specific attention paid to the tariff effects on groundfish fillets, frozen and canned tuna. There is also an explanation of the effects on United States fisheries of the trade policies of other countries. The author concludes that the U. S. gives limited consideration as to the importance of its fisheries from the standpoint of upstenance, trade and geopolitics and accordingly acts in limited ways. Whether this is in the national interest is a question that must be studied fully in the years immediately ahead. (Murphy-Rutgers)
/69-07193

HE GENERAL THEORY OF SECOND BEST,
. Lipsey, and K. Lancaster.
eview of Economic Studies, Vol 24, pp 11-32, ecember 1956. 22 p, 1 fig, 2 tab.

escriptors: *Optimization, *Optimum development plans, *Tariff, Price, Marginal costs, Constraints.
dentifiers: *Welfare economics, Trade, Multiple-yer optima.

this paper an attempt is made to develop a eneral theory of second best. In Section I a verbal atement is given of the theory's main general heorem, together with two important negative orollaries. Section II outlines the scope of the eneral theory of second best. Next, a brief survey given of some of the recent literature on the subct. This survey brings together a number of cases which the general theory has been applied to arious problems in theoretical economics. The imications of the general theory of second best for ecemeal policy recommendations, especially in elfare economies, are considered in Section IV. ollowing this are two examples of the application the theory in specific models and a rigorous roof of the central theorem. The paper concludes ith a brief discussion of the difficult problem of ultiple-layer second-best optima. This article is he seminal treatment of welfare conditions in a on perfectly competitive environment and it has heoretical extensions to the welfare implications water resource and development programs. Murphy-Rutgers)
/69-07194

C. Cost Allocation, Cost Sharing, Pricing/Repayment

N ANALYSIS OF ALTERNATIVE METHODS F FINANCING TYPES OF WATER ESOURCE FACILITIES IN MISSISSIPPI,
lississippi State Univ., State College. Water esources Research Inst.
uy T. Peden, J. R. Pulley, and J. L. Roberts.
/ater Resources Research Institute, Mississippi tate University, 1968. 62 p, 1 fig, 16 tab, 21 ref, 3 ppend.

Descriptors: *Financing, *Municipal water, Mississippi, Government supports, Grants, Loans, Initial costs, Maintenance costs.
Identifiers: *Water associations, Farmers Home Administration loan, Bond issue, Operating revenue, Water facilities.

The analysis of 50 water association and 24 municipalities in central Mississippi had four objectives: (1) determine the type of water facility needed; (2) determine underlying factors causing this need; (3) determine the success of financing method used; and (4) determine and analyze problem areas resulting from the method of financing chosen. Three sets of questionnaires and follow-ups were used for Associations. Personal interviews with the Mayor, city, clerk, or a representative of either were used for municipalities. In financing original water systems, most associations utilized the terms of the maximum Farmers Home Administration loan. Deviations were small incorporated municipalities. Associations involved in improvements and/or extensions to their original systems are discussed. Problems of associations in obtaining funds and managing systems are discussed. After differentiating municipalities from associations, the report defines characteristics of the municipal study area. Types of facilities constructed and their costs are discussed. Methods of financing include: (1) private loan; (2) cash operating revenue, or retained earnings; (3) bond issue; and (4) government loan or grant. Existing source (s) of funds for each municipality are discussed. No common, general financing problems appear, but individual problems of different communities are discussed. (Gossen-Chicago)
W69-06856

RIGHTS, POWERS, DUTIES, MUNICIPALITIES.

Minn Stat Ann secs 465.18, 465.19, 465.26 to 465.29, 465.48, 465.49 (1947).

Descriptors: *Minnesota, *Ownership of beds, *Navigable waters, *Flood control, Cities, Rivers, Streams, Alteration of flow, Legislation, Navigation, Lakes, Dams, Water levels, Eminent domain, Condemnation, Taxes, Assessments, Government finance, Diversion, Channels, Dredging, Channel improvement, Nonnavigable waters, Regulation.

The ownership of beds of all navigable rivers in Minnesota is in the state, subject only to regulations of Congress and lawful public use. When any portion of the channel of such navigable river within the city limits of a municipality is changed by any authority for the improvement of navigation, and the city bears some of the cost of such change, the beds, abandoned due to the change, shall belong to the city. Larger cities may, for promotion of public welfare, divert any nonnavigable stream flowing within its limits from its natural bed to another channel. Cities may also regulate the flow of such streams by controlling discharge of lakes, and by improving the channels as necessary. The exercise of the power of eminent domain and the power to levy assessments is regulated. Certain cities have the authority to dredge lakes within their city limits, to maintain a water level therein and to park the shores of such lakes. Emerging flood prevention lands, financed through special tax levies, have been created in smaller cities. Larger cities are authorized to finance flood control measures by issuing bonds. (Wheeler-Fla)
W69-06935

A SHORT CUT TO CAPITAL BUDGET FORECASTING FOR PUBLIC UTILITIES,
J. F. Brennan.
Engineering Economist, Vol 14, No 3, pp 151-158, Spring 1969. 8 pp, 1 fig, 1 tab, 3 ref.

Descriptors: *Forecasting, *Budgeting, *Laplaces equations, Computers, Projections, Financial planning, Depreciation, Growth rates.
Identifiers: *Input data, *Optimization of capital structure, *Budget estimator, *Integral equation, *Parameters, Plant balance, Growth pattern, Frequency curve.

This article presents a method of forecasting the capital budget for public utilities on a short-term or long-term basis, through the use of Laplace transforms. This method was proposed as a short-cut around the mass of detail generally characteristic of such estimates. It is noted that certain elements of such budgets will always require individual attention; this method is designed to treat the majority of data en masse with acceptable estimating tolerance. To attain this, the capital budjet must provide for replacing equipment as it retires, provide for the subsequent replacement of the replacements, and provide for the new capital expenditures necessary to sustain the predicted growth. To achieve this ideal, this method suggests input data of only the present plant balance, its average age, estimated average life and growth pattern in the recent past. Computer time for a ten-year projection, by years, is less than ten seconds. This method can be quickly applied to meet a changing condition, such as inflation. Due to the importance of capital budgeting in water research and development this article suggests a method which may be used for water problems. (Murphy-Rutgers)
W69-07157

THE REGULATION OF QUEUE SIZE BY LEVYING TOLLS,
Technion - Israel Inst. of Tech., Haifa; and North Carolina Univ., Chapel Hill.
P. Naoy.
Econometrica, Vol 37, No 1, pp 15-24, January 1969. 10 p, 1 tab, 3 ref.

Descriptors: *Queueing theory, Profit, Costs, Income.
Identifiers: *Queue size, *Tolls, *Public good, Service station, Rewards, Traffic density, Laissez faire, Subsidies.

A queueing model--together with a cost structure--is presented, which envisages the imposition of tolls on newly arriving customers. It is shown that frequently this is a strategy which might lead to the attainment of social optimality. The basic features of the model are shaped by the assumption of the existence of a public good and by the assumption of possible non-admission of customers to the service station. Rewards are considered to be constant and equal. Again, no basically different results would have been obtained had these rewards been drawn from a distribution. A strong modification may be called for if it were assumed that the reward obtained depends in some way on the effective traffic density. It can be shown that a policy of 'laissez faire' is only rarely and accidentally a correct one. In this more general case, in which effective interaction between customers and therefore dependence on traffic density is assumed, the proper strategy is not necessarily the imposition of a toll. Cases can be constructed where the handing out of subsidies to joining customers optimizes public good. This article could be applicable to water problems due to the public good aspect of water and the problems of water allocation which might require a queueing type of approach. This article is also relevant to the admissions policies of water recreation sites. (Loeb-Rutgers)
W69-07168

ON THE NATURE AND SIGNIFICANCE OF SOCIAL COSTS,
Basel Univ. (Switzerland).
K. William Kapp.
Kyklos, Vol 22, Fasc 2, pp 334-347, 1969. 14 p.

Descriptors: *Economics, *Costs, Resource allocation, Air pollution, Public health, Market value.
Identifiers: *Social cost, *Social benefit, External economies, Neoclassical economics, Alfred Marshal, W Michalski, Public investment, Pigou, Christian Uhlig, Myrdal.

This paper discusses the challenging difficulties to economic analysis presented by the problem of social cost. It remains doubtful whether these difficulties can be coped with adequately within the traditional boundaries of economic science. Neither the theory of resource allocation nor applied economics seem to provide adequate categories for the theoretical treatment of social costs or practical guidelines for their control. The concept of social costs, itself, was developed as an analytical instrument and as a critique of the method and scope of classical and neoclassical economic analysis. Social costs refer to consequences of productive activities and policy decisions which, for several reasons, carry an inevitable residuum of indeterminacy but which are nevertheless real and important, even though their approximate magnitude can be determined only after careful study which in many instances call for an evaluation based upon criteria other than market values. The author suggests wider concepts of social costs and social benefits than those that emerge from an attempt to incorporate these notions into traditional theory. Social costs are closely involved with water pollution problems and as such this article presents a general treatment of the economic basis of the social cost concept for the water researcher. (Loeb-Rutgers)
W69-07171

OPTIMAL SUBSIDIES AND TAXES WHEN SOME FACTORS ARE TRADED,
Massachusetts Inst. of Tech., Cambridge; Indian Ministry of Finance; Stanford Univ., Palo Alto, Calif.; and Indian Statistical Inst., New Delhi.
U. K. Ramaswami, and T. N. Srinivasan.
Jour Pol Econ, Vol 76, No 4, pt 1, pp 569-582, July/August 1968. 14 p, 2 fig, 10 ref, 2 append.

Descriptors: *Tariff, Welfare, Wages, Constraints.
Identifiers: *Optimal policies, *Revenue, Trade taxes, Consumption tax, Intermediate goods, Production function, Utility function, Subsidies, Outout diversification.

Trade taxes would secure revenue without welfare loss, instead of a uniform consumption tax, if factor supplies are inelastic. It is often not feasible, particularly in underdeveloped countries, to tax the consumption of much of home output. It is, therefore, of practical importance to determine the optimal policies for collecting specified revenue through trade taxes. It is shown in this paper that inputs used in export production must be free of duty in the second-best revenue tariff. It is also shown that optimal revenue duties on imports for home use will in general not be uniform. This does not, of course, mean that complex tariffs in the real world, which have been framed largely in response to pressures of interested groups, are optimal. What the conclusion suggests is that revenue tariffs should be based on objective empirical research. This conclusion could be applied to tariffs or fees on water traded interregionally or internationally whose main purpose was the raising of additional revenue. (Sokoloff-Rutgers)
W69-07172

THE INTERPRETATION OF VOTING IN THE ALLOCATION OF ECONOMIC RESOURCES,
Grinnell Coll., Iowa.
Howard R. Bowen.
Quarterly Journal of Economics, Vol 58, No 4, pp 27-48, November 1964. 22 p, 6 fig, 1 tab.

Descriptors: *Social needs, *Distribution patterns, *Costs, *Cost-sharing, Taxes, Education.
Identifiers: *Social goods, *Individual goods, *Ideal output, *Voting, Quantitative measurement, Marginal rate of substitution, Consumer choice.

The article begins with a comparison of individual goods with social goods. The bulk of economic thought has been devoted to individual goods. The author is attempting to show how certain portions of conventional economic theory may be adapted to problems relating to the production of social goods. The article proceeds to a formulation of the basic principles to guide the production of social goods, the application of these principles and the examination of problems in the distribution of costs. Thus, the alternatives for quantitative measurement of social goods are explained as well as the means for determining the ideal output of social goods. Voting in terms of a substitute for consumer choice in determining what social goods are to be provided and in what quantities, is discussed. The article concludes with a discussion of the problems of distributing social goods and their unequal benefits. Since water resources have public good components the problems discussed here have relevance to the water resource planner. (Murphy-Rutgers)
W69-07181

DECOMPOSITION, PRICING FOR DECENTRALIZATION AND EXTERNAL ECONOMIES,
Princeton Univ., N. J.; and Mathematica, Princeton, N. J.
W. J. Baumol, and T. Fabian.
Management Science, Vol 11, No 1, pp 1-31, September 1964. 32 p, 4 fig, 1 tab, 13 ref.

Descriptors: Linear programming, *Optimization, Constraints, Profit.
Identifiers: *Decomposition method, External economies, External diseconomies, Marginal yield, Multipliers, Decentralization, Dual prices.

The decomposition procedure for the solution of large scale linear programs is described in an elementary manner with illustrative calculations. Its economic interpretation as a procedure for decentralized decision by the multi-division firm or the multi-sector economy is explained in detail. Decomposition is shown to provide internal prices for decentralized decision making in the presence of external economies or diseconomies. However, it is demonstrated that in many cases there exist no prices which will lead divisions to make independent decisions that are optimal from the point of view of the company or economy as a whole. Of particular interest to the water resource researcher is the explanation provided of the way in which penalties and bonuses can be calculated and imposed to modify the price system in dealing with external economies and diseconomies. (Murphy-Rutgers)
W69-07182

MARGINAL COST PRICING IN PRACTICE,
Amherst Coll., Mass.
J. R. Nelson.
Englewood Cliffs, N. J., Prentice-Hall Inc, 1964. 266 p.

Descriptors: *Marginal costs, *Tariff, *Uncertainty, *Inflation, *Investment, Financing, Prices, Operating costs, Capital costs, Interest rates, Resource allocation, Budgeting.
Identifiers: *Marginal cost pricing, *Rate structures, *Cost dimensions, *Elasticity of demand, *Financial constraints, Decreasing costs, Increasing costs.

The book is a collection of translations of various French journal articles dealing with marginal cost pricing in the public utilities sector. The application of these pricing concepts is particularly useful in the water resource area. The first chapter provides a summary of the research conclusions of the basic tariff studies of Electricite de France as well as suggestions for future research and practical application. Chapter two provides an introduction into the principles of rate-fixing. Chapters three through six seek to define marginal cost and give demonstrations of how marginal cost is a function of demand. Following a discussion of load factor problems and the importance of time there is a chapter dealing with costs and prices based on uncertainty. Later chapters describe the application of the theory through the use of tariffs. A chapter is devoted to the complexities of water power. The final chapters discuss problems of pricing with given cost structures and cost minimization with maximum economy of operating and capital costs. This book provides for the water researcher a useful survey and treatment of both theoretical and applied issues in marginal cost pricing. (Murphy-Rutgers)
W69-07184

THE PROBLEM OF SOCIAL COST,
Virginia Univ., Charlottesville.
R. H. Coase.
The Journal of Law and Economics, Vol 3, No 4, pp 1-14, October 1960. 15 p.

Descriptors: *Cost sharing, *Pricing, *Government supports, *Welfare economics, Damages, Industrial production.
Identifiers: *Social costs, *Rights, Liability, Market transactions, Private product, Social product.

This paper is concerned with those actions of business firms which have harmful effects on others. The problem is how to avoid serious harm to any member of the community. This is the problem, for example, faced by the water resource planner in attempting to control the undesirable effects of commercial water usage or water development. The author discusses the role of the pricing system with and without liability for damage. The author attempts to take the cost of market transactions into account when considering a solution to the problem. A large section is devoted to Pigou's treatment of the problem with the conclusion that his position is somewhat unsatisfactory. Thus, the author concludes that the traditional approach based on this analysis is faulty and proposes a change which will consider the total effect of an economic action. (Murphy-Rutgers)
W69-07188

INTEGER PROGRAMMING AND PRICING,
Thomas J. Watson Research Center, Yorktown Heights, N. Y.; and Princeton Univ., N. J.
Ralph E. Gomory, and William J. Baumol.
Econometrica, Vol 28, No 3, pp 521-550, July 1960. 30 p, 9 fig, 6 tab, 13 ref, 2 append.

Descriptors: *Pricing, Linear programming, Fixed costs, Costs, Resource allocation, Constraints, Competition.
Identifiers: *Integer programming, *Method of integer forms, Dual prices, Shadow prices, Input, Output, Simplex method, Marginal valuation, Free good.

The method of integer forms (MIF) for solving integer programming problems is described. The paper discusses the pricing problem in the integer programming case--the case where, in economic terms, the inputs and outputs are not perfectly divisible. It is shown that the MIF algorithm produces a dual problem whose solution also inputs shadow prices to the scarce inputs. These prices possess a number of the properties of the dual prices of ordinary linear programming. In particular, they possess one of the most important properties of ordinary dual prices, that is, they permit the construction of a decentralized decision making arrangement which, in principle, will achieve some of the possible efficient allocations of resources. However, the price system no longer suffices to achieve every efficient allocation and when the consumer side of the market is taken into account the entire ideal output theorem of perfect competition runs into difficulties. Integer programming techniques have proven to be quite helpful in water research problems both in engineering and economic applications. This article in apply techniques to situations where inputs and outputs are indivisible has potential applications to the water resource area where this condition is constantly present. (Loeb-Rutgers)
W69-07189

6D. Water Demand

SOCIOECONOMIC FACTORS AFFECTING PARTICIPATION IN WATER-ORIENTED OUTDOOR RECREATION,
Missouri Agricultural Experiment Station, Columbia. Dept. of Agricultural Economics.
Durward Brewer, and Glenn A. Gillespie.
ERS-403, U.S.D.A. Econ. Res. Serv., Missouri Exp. Station, April 1969. 37 p, 25 tab, 3 fig, 1 append, 19 ref.

Descriptors: *Survey, Statistical methods, *Recreation demand, Recreation facilities.
Identifiers: *Socioeconomic characteristics, Analysis of variance, Duncan's test.

Socioeconomic characteristics can be used by public planners and private investors to estimate demand for water-oriented recreation. Important socioeconomic characteristics are annual family income, education, sex, race, age, occupation, and leisure time. About 67 percent of the families interviewed participated in water-oriented recreation. Through statistical analysis the affect of each socioeconomic characteristic on water-oriented recreation was measured. An appendix and a selected bibliography are included. (Grossman-Rutgers)
W69-06844

AN ECONOMETRIC MODEL FOR PREDICTING WATER-ORIENTED OUTDOOR RECREATION DEMAND,
Missouri Agricultural Experiment Station, Columbia. Dept. of Agricultural Economics.
Glenn A. Gillespie.
ERS-402, U.S.D.A. Econ. Res. Serv. Missouri Exp. Station, March 1969. 15p, 3 tab, 1 append, 1 bib, 5 ref.

Descriptors: *Demand, *Survey, Regression analysis, *Recreation demand.
Identifiers: *Socio-economic characteristics, *Econometric model.

The econometric model analyzes socio-economic characteristics associated with water-oriented outdoor recreation activities of people: annual family income, education, sex, race, age, and occupation. The information was obtained from interviews with 1,000 families in the St. Louis, Missouri area. The model makes possible estimations of future demand. However, the parameters may be different in other areas, and the parameters may change over time. The parameters will have to be re-assessed under these different conditions. (Grossman-Rutgers)
W69-06845

THE ECONOMIC SIGNIFICANCE OF COLUMBIA BASIN PROJECT DEVELOPMENT,
Bureau of Reclamation, Vancouver, Wash. Columbia Basin Project Office.
A. L. Walker, B. D. Parrish, H. O. Ward, O. L. Adams, and O. L. Brough, Jr.
Washington Agr. Exp. Sta., Coll. of Agr., Washington State Univ., Bulletin 669, Sept. 1966. 62 p, 12 map, 13 photo, 38 fig, 63 tab, 2 append, 6 ref.

Descriptors: *Columbia River Basin, *Economic impact, *Irrigation effects, Grand Coulee Dam, Dry farming, Land use.

The Columbia Basin Project is a multiple purpose development of water resources. The methodology used is to compare the economic growth in the Columbia Basin Project area with a non-irrigated dryland farming area which is similar to the project area except for irrigation. The report includes a description of the areas studied: natural resources, history, and project facilities. To determine the economic impact of the project the study examined the development of farm resources, the effects of agricultural development on non-farm economic activities, population, business and employment, postal receipts, consumption of electricity, telephone service, property values, tax receipts, public services, and complementary contributions from the Grand Coulee Power Plant and other areas. The report includes much statistical information, graphs, and two appendices. (Grossman-Rutgers)
W69-06848

WATER RESOURCES OF NORTH CAROLINA: BROAD AND CATAWBA RIVER BASINS.
North Carolina State Dept. of Conservation and Development. Div. of Water Resources, Inlets and Coastal Waterways.

Division of Water Resources, Inlets and Coastal Waterways, Volume VIII of XII volumes containing information regarding water resources of North Carolina, Raleigh, 1958. 138 pp, 320 tab.

Descriptors: *North Carolina, *Water resources, Municipal water, Agriculture, Industrial water, Water users, Electric power industry, Recreational facilities, Chemical properties, Water supply, Groundwater, Surface waters, Irrigation permits, Wells, Legislation, Streamflow, Water quality, Soil conservation, Navigation, Floods, Streams, Tributaries, Topography, Geology, Forest soils, Climatic data, Human population, Lumbering, Mining, Transportation, Mapping.
Identifiers: County governments, Muddy Creek Watershed Project.

The report describes the North Carolina watershed, including main streams, principle tributaries, topography, geology, forest cover, climate, population, industry, agriculture, lumbering, mining, transportation, mapping, watershed boundaries, and general information regarding counties. Chapters two-five discuss use of water for: domestic and municipal purposes; agriculture; industry; and, electric power and recreation. These discussions include descriptions and chemical character of public surface and ground water supplies in each county; data regarding agricultural production; a listing of irrigation permits; records of wells that supply water for industries; House Document No. 96, 73rd Congress, 1st session; generation of power by the Duke Power Co.; and a listing of recreational facilities. The sixth chapter gives streamflow records for fourteen locations. The seventh discusses the groundwater supply of the Statesville and Charlotte areas. Chapter Eight discusses quality of public water supplies and chemical character of surface waters at eighty-three locations. Chapter nine states stream sanitation policy and the powers and action of the State Stream Sanitation Committee. Chapter ten discusses soil conservation practices, the Muddy Creek Watershed Project, and its work plan. Chapter eleven discusses existing navigation projects; floods of July 1916, August 1928 and October 1929; and flood control in the Santee River Basin. (Gossen-Chicago)
W69-06852

SOCIOLOGICAL AND SOCIAL PSYCHOLOGICAL FACTORS RELATED TO METROPOLITAN WATER RESOURCES DEVELOPMENT,
Utah State Univ., Logan.
For primary bibliographic entry see Field 06B.
W69-06853

RESEARCH ON RECREATIONAL USE OF WATERSHEDS AND RESERVOIRS,
Public Health Service, Cincinnati, Ohio. Div. of Criteria and Standards.
J. Keith Carswell, James M. Symons, and Gordon G. Robeck.
J Amer Water Works Ass, Vol 61, No 6, pp 297-304, June 1969. 8 p, 5 fig, 2 tab, 13 ref.

Descriptors: *Water supply, *Recreation, *Reservoirs, Multiple-purpose projects, Aesthetics, Water quality, Behavior, Lakes, Psychological aspects, Public health, Recreation demand, Reservoir operation.
Identifiers: Reservoir use.

Studies of the effects of recreational use of watersheds and reservoirs on water quality and the question of whether such use should be permitted are reviewed. Although it is common practice to ban recreational use, several recent studies show that properly regulated recreation has no deleterious effects. Other studies show rather severe recreational pollution, most of which seems to be caused by lack of cooperation with the reservoir management, littering, unsanitary habits, and willful destruction and fouling. It is concluded that recreation need not be prohibited in many water-supply reservoirs, depending on local feelings, costs, and public willingness to obey sanitary regulations. (Knapp-USGS)
W69-07085

SCIENTIFIC INVESTIGATIONS PERTAINING TO THE PROBLEMS OF WATER ECONOMY (RUSSIAN).

Moscow, 'Nauka' 1968. 163 p.

Descriptors: *Water resources development, *Economic justification, *Water utilization, Water demand, Water sources, Water circulation, Canals, Irrigation, Artesian wells, Water properties, Water management, Hydrologic properties, Biochemistry, Water balance, Sea water, Exploitation.
Identifiers: *USSR, Water economy study.

This monograph is a collection of 86 abstracts for brief investigations mainly completed in 1963 and prior to this date on the use and conservation of water resources of the USSR. The papers and abstracts presented in this book can be subdivided into the following broad groups: (1) water resources and national economy water demand; (2) the study of qualitative and quantitative characteristics of water resources; (3) the basic data on quantitative distribution and qualitative transformation of water resources; (4) the study of water mass circulation and its effect on the surrounding medium; (5) methods for the construction of the scheme of total utilization of water resources; and (6) water economy structures, their evaluation and their exploitation. (Gabriel-USGS)
W69-07154

UTILITY AS A SURROGATE FOR VALUE IN WATER RESOURCES ANALYSIS,
Rutgers - The State Univ., New Brunswick, N. J.
For primary bibliographic entry see Field 06B.
W69-07158

INTERREGIONAL FEEDBACKS IN INPUT-OUTPUT MODELS: SOME EXPERIMENTAL RESULTS,
Pennsylvania Univ., Philadelphia.
For primary bibliographic entry see Field 06A.
W69-07161

ANALYTICAL ISSUES IN DEMAND ANALYSIS FOR OUTDOOR RECREATION,
Oregon State Univ., Corvallis.
Herbert H. Stoevener, and William G. Brown.
Journal of Farm Economics, Vol 49, No 5, pp 1295-1304, December 1967. 10 p, 2 fig, 1 tab, 12 ref.

Descriptors: *Recreation, Estimating, Demand, Welfare, Income, Marginal utility.
Identifiers: *Policy issues, *Research problems, Quantitative estimates, Option demand, Opportunity demand, Consumer surplus, Willingness to pay.

The current interest in analytical issues of evaluating the demand for outdoor recreation stems both from the need for policy guidance in this important area of resource allocation and from the recent

quantitative work in estimating demand functions for outdoor recreational services. In this paper the authors attempt the following: First, they address themselves to a set of arguments which challenge fundamentally the idea of quantifying the demand for outdoor recreation. Second, they direct attention to some areas in which additional work appears to be necessary, if the general framework of economic analysis is accepted. They raise some analytical issues which appear to be relevant from a policy viewpoint. Some available empirical results are presented. The importance of water facilities in outdoor recreation make this article relevant to water resources research. (Loeb-Rutgers)
W69-07175

DISCUSSION: ANALYTICAL ISSUES IN DEMAND ANALYSIS FOR OUTDOOR RECREATION,
Utah State Univ., Logan.
B. Delworth Gardner.
Journal of Farm Economics, Vol 49, No 5, pp 1304-1306, December 1967. 3 p.

Descriptors: *Demand, *Recreation, Demand schedule, Resource allocation, Marginal utility, Welfare, Statistical methods, Costs, Pricing.
Identifiers: *Demand analysis, Price system.

This paper discusses the previous paper by Stoevener and Brown. In the study of outdoor recreation, economists have seemingly divided themselves into two camps. In the first group are those who believe that the price system should be used, directly or indirectly, in allocating resources to outdoor recreation. This group does not unanimously favor the imposition of use fees but does believe that at least surrogate prices should be estimated to guide resource commitments to recreation. The second group argues that, for various reasons, economics has little to contribute in this area. Recreation prices should be zero and the resource allocation decisions should be settled by political means. The author feels that Stoevener and Brown belong to the first group. Their paper is an attempt to answer some of the more serious objections of the 'detractors' of economics. Failure to use large doses of economics in allocating resources to outdoor recreation makes it impossible to detect bad management and gross inefficiency. The economic criteria used to assign benefit values to water oriented outdoor recreation has important impacts on the cost justification of many water projects. Accordingly, this article is relevant to water recreation planners in its argument for improving the economic framework of recreation pricing. (Loeb-Rutgers)
W69-07176

POLICY ISSUES AND PROBLEMS IN OUTDOOR RECREATION,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 06B.
W69-07177

DISCUSSION: POLICY ISSUES AND PROBLEMS IN OUTDOOR RECREATION,
Bureau of Commercial Fisheries, Washington, D. C.
For primary bibliographic entry see Field 06B.
W69-07178

6E. Water Law and Institutions

URBAN ENVIRONMENTAL PROBLEMS: ROLE OF THE FEDERAL GOVERNMENT,
Florida Univ., Gainesville. Water Resources Research Center.
Fletcher N. Baldwin.
Engineering Progress, University of Florida, Vol XXI, No 6, Bulletin No 128, pp 19-51, June 1967. 31 p, 173 ref.

Descriptors: *Federal jurisdiction, *Water law, Judicial decisions, Water rights, Federal-state water rights conflicts, Federal project policy, Riparian rights, State jurisdiction, History, Navigation, Florida, Water supply.
Identifiers: Federal constitution, Commerce Clause.

There are sufficient constitutional provisions and U.S. Supreme Court decisions to allow the federal government to establish a national policy of water regulation and control, and water law is slowly moving in that direction. Major discussion topics include: national policy and water rights in Florida and in the east, where water is still abundant; a history of federal water regulation; federal constitutional power; Supreme Court interpretation of the Commerce Clause; the first and second tests of navigability; the elimination of any opportunity for states to negate federal jurisdiction by compact with another state; initial effect of the Commerce Clause upon nonnavigable streams; limitation upon state and private water rights; extension of federal authority into nonnavigable waters; dominant federal servitude along navigable and nonnavigable waters; limitation upon federal 'taking'; and, the present status of the riparian owner in relation to federal projects on navigable and nonnavigable streams. In conclusion, the Supreme Court will have final say in interpreting federal water rights. It is probable that distinctions between navigable and nonnavigable streams will be practically eliminated. The water conflict is a dilemma that involves basic ideas of states' rights as opposed to national interests. (Gossen-Chicago)
W69-06842

THE SACRAMENTO DIVERTERS CONTROVERSY - A STUDY IN THE LEGAL ADJUSTMENT OF EXTERNALITIES,
California Univ., Los Angeles. Dept. of Economics.
David L. Shapiro.
Mimeograph report for presentation at Western Econ. Assoc., Cowallis, Oregon, Aug. 22, 1968; Dept. of Econ., Univ. of Cal., Los Angeles. 9 p, 5 tab, 1 append, 6 ref.

Descriptors: *Federal government, *Water law, Government finance, Supply.
Identifiers: *Trinity River Project, *Externalities, *Diseconomies.

Legal diseconomies resulted in a water supply shortage. Government aid tried to relieve these diseconomies, but the aid only created a new set of externalities. To relieve the shortage the Trinity River Project was planned. The history of this case is examined. (Grossman-Rutgers)
W69-06846

PROSPECTUS: WATERSHED PLANNING PROGRAM FOR BUFFALO AND MCDONALD CREEKS.
Harza Engineering Co., Chicago, Ill.
For primary bibliographic entry see Field 06B.
W69-06849

LEGAL RESEARCH IN WATER RESOURCES,
Office of Water Resources Research, Washington, D. C.
For primary bibliographic entry see Field 09D.
W69-06868

UNLAWFUL DAMAGE TO SAND DUNES AND OCEANSIDE BEACHES.

N Y Penal Law sec 1423-c (McKinney 1968).

Descriptors: *New York, *Dunes, *Beaches, *Shores, Legislation, Legal aspects, Public lands, Coastal structures, Shore protection, Damage.
Identifiers: Penalties (Criminal).

Any person who wilfully or maliciously removes, weakens, damages, or destroys any portion of a sand dune constructed with state or federal money, whether on private or public property, or on any shore of the state, shall be punished by fine, imprisonment, or both. It shall be unlawful to drive a vehicle over, upon, or along a sand dune unless a device sufficient to protect the dune from damage is used. (Shevin-Fla)
W69-06869

MALICIOUS INJURY TO AND DESTRUCTION OF PROPERTY.

N Y Penal Law secs 1425.8, 1425.12 (McKinney 1968).

Descriptors: *New York, *Oysters, *Lakes, *Poisons, Legislation, Shellfish, Damage, Rivers, Bay, Sound, Buoys, Boats, Beds, Ponds, Fish.
Identifiers: Piscivorous fish, Penalties (Criminal).

It is a misdemeanor to disturb an oyster or shellfish bed which is legally planted in any waters of the state or to destroy a stake or buoy designating the bed. A bed is legally planted when it is planted under the authority of the state or under a lease made with any town or city. A bed is legally marked when the owner can show that one or more stakes were placed at the corner of the bed at least 90 days before the offense was committed. Evidence showing that any boat or vessel was used to carry away oysters shall create a presumption of guilt against the owner, master, or crew of the vessel. It is unlawful to take, or attempt to take, without consent of the owner, any fish from a lake or pond that is situated so that the fish could not pass into it from any other body of water. It is unlawful to place any piscivorous fish or poisonous substance injurious to the health of the fish in any lake or pond without the consent of the owner. It is unlawful to let water out of a lake with the intent to take or harm the fish located therein. (Shevin-Fla)
W69-06870

DELAWARE RIVER BASIN WATER COMM'N COMPACT.

N Y Unconsolidated Laws secs 1581-1584 (McKinney Supp 1968).

Descriptors: *New York, *Delaware River Basin Comm'n, *State governments, *Interstate compacts, New Jersey, Pennsylvania, Delaware River, Streams, Surface waters, Dams, Reservoirs, Impounded waters, Riparian rights, Riparian lands, Eminent domain, Condemnation, Legislation, Water conservation, Water demand, Water resources development, Water supply, Water distribution (Applied), Public benefits, Legal aspects, Competing uses.

The Delaware River Basin Water Commission is comprised of three Commissioners, each appointed by the governor of his respective state. The federal government may be represented on the Commission by three advisory members. No action taken at any meeting of the Commission shall have force and effect until the governors of the signatory states are afforded an opportunity to approve or veto such action. The Commission is invested with all the rights and obligations inherent in natural persons and corporations for the effectuation of its authorized purposes. The Commission may acquire property within the Delaware Basin by eminent domain and condemnation proceedings. A signatory state's consent to the acquisition, occupation, and use of real property within its borders for maintenance of dams, reservoirs and related structures is required. The Commission is prohibited from transmitting hydroelectric power except for its own use. The Commission's activities may be financed by loans from the signatory states and by the issuance of negotiable bonds. The Commission shall endeavor to provide a common water supply and shall regulate such supply on the basis of equitable apportionment. (Katz-Fla)
W69-06871

DRAINAGE AND RECLAMATION OF LANDS.
N J Stat Ann secs 40:57-1 to 40:57-11 (1967).

Descriptors: *New Jersey, *Drainage districts, *Land reclamation, *Federal project policy, Federal government, Local governments, Administrative agencies, Drainage programs, Drainage systems, Dredging, Landfills, Cost allocation, Cost sharing, Taxes, Financing, Assessments, Maps, Cities, Riparian land, Swamps.

Chapter 57 of the New Jersey Statutes, entitled Drainage and Reclamation of Lands, consists of eleven subsections. Section one deals with the creation of municipal districts for reclamation and improvement of lands and with federal cooperation in that effort. Section two deals with cost allocation regarding such improvements and the duties of the State Board of Commerce and Navigation in furnishing a report and map. Section three concerns various procedural prerequisites the municipality must follow pursuant to obtaining federal assistance. Section four deals with the proceedings required upon failure of a municipality to join in such a proposed joint project. Section five enables dredged materials to be used as fill and authorizes the necessary entrance upon the lands to be improved. Section six concerns the financial and budgetary duties of a municipality in carrying out a project. Section seven concerns the application of receipts from assessments and the use of a tax levy or a bond issue if assessments prove insufficient. Section eight concerns the mode of municipal assessments of the lands benefited by these projects. Section nine deals with municipal assessments of riparian or submerged lands benefited. Section ten deals with the drainage of swamps and meadows. Section eleven establishes proceedings whereby small landowners may drain and improve their lands. (Carruthers-Fla)
W69-06872

FINDLEY LAKE PROPERTY OWNERS, INC V TOWN OF MINA (COMPETING USES).
154 NYS 2d 775-809 (Sup Ct 1956).

Descriptors: *New York, *Lakes, *Dams, *Proprietary power, Prescriptive rights, Reasonable use, Competing uses, Riparian rights, Riparian lands, Reservoir operation, Hydraulic structures, Mill dams, Streams, Aquatic weeds, Prior appropriation, Judicial decisions, Legal aspects, Remedies, Water level fluctuation, Water level, Water wells, Cities, Real property, Land tenure.
Identifiers: Injunctions (Prohibitory).

Plaintiff brought this action to evict a town board from certain premises and to permanently enjoin the board from constructing and maintaining gates at the plaintiff's damsite. The board contended that plaintiff's lowering of the lake level to make dam repairs and its poisoning of aquatic weeds threatened the recreational use of the lake, resulted in an unhealthful condition, and constituted a public nuisance. The court determined that the existence of a public nuisance was not proved beyond a reasonable doubt, as required by law, and held that the board's seizure of the dam site was not an abatement but a trespass. The board contended that the plaintiff's predecessors in title to the dam owned the right to use the impounded water only for generating power and that plaintiff's use of the dam for purposes of water level control was beyond the scope of the interest acquired. The court found an inherent inconsistency in the terms of the deed which justified consideration of the intent of the parties thereto. The court held that the parties intended the plaintiff to receive the right to use the impounded water for lake level control. (Katz-Fla)
W69-06873

RIVER DEVELOPMENT CORP V THE LIBERTY CORP (OWNERSHIP BELOW THE HIGH WATER MARK, LAND RECLAMATION).

45 N J Super 445, 133 A 2d 373-389 (1957).

Descriptors: *New Jersey, *Ownership of beds, *Boundaries (Property), *Patents, Leases, Proprietary power, Contracts, Tidal waters, High water mark, Low water mark, Submerged lands act, Dredging, Landfills, Riparian rights, Riparian lands, Land reclamation, Land tenure, Legislation, Legal aspects, Judicial decisions.
Identifiers: United Companies Act, General Riparian Act, Injunctions (Prohibitory).

The plaintiff sought to enjoin defendant from conducting dredging operations in certain tidal waters which plaintiff claimed to own. The plaintiff's claim was based on the United Companies Act which, plaintiff contended, granted the tidal land in question to his predecessors in title. The defendant contended that the Act merely vested plaintiff with a revocable license and was not a grant in fee. The defendant further contended that the state had revoked the license and had granted to defendant the privilege to conduct dredging operations. The court examined the Companies Act in pari materia with the General Riparian Act passed the same day. The court concluded that the Companies Act created a revocable right in the plaintiff to reclaim the lands in question but found that right had been revoked by the General Riparian Act and subsequent legislation. Public policy required that title to land beyond the high water mark be vested in the state. (Katz-Fla)
W69-06874

FAXON LAND CO V LAUBACH (SUIT TO ENJOIN BROUGHT AGAINST WRONG PARTY).

5 Lycoming 169, 7 D and C 32-34 (C P Lycoming County Pa 1956).

Descriptors: *Pennsylvania, *Jurisdiction, *Pipes, *Contracts, Road construction, Drainage systems, Legal aspects, Judicial decisions, Conduits, Surface runoff, Surface drainage, Damages, Maintenance.
Identifiers: Indispensible party, Trespass, Independent contractor.

Plaintiff sought to enjoin maintenance of a drain pipe which cast water upon his property. The defendant in this action was a contractor who constructed the pipe pursuant to contractual arrangements between himself and the Pennsylvania Department of Highways. The work was done at the direction and under the supervision of the Secretary of Highways. The court dismissed the bill on jurisdictional grounds, finding that the action should have been commenced in Dauphin County and that the Commonwealth was the proper party defendant. (Logan-Fla)
W69-06875

EMINENT DOMAIN - TAKING OR INJURY OF PROPERTY AS GROUNDS FOR COMPENSATION - NAVIGATIONAL SERVITUDE,
H. R. Weinberg.
Case W Res L Rev, Vol 19, No 4, pp 1116-1123, June 1968. 8 p, 45 ref.

Descriptors: *Riparian rights, *Eminent domain, *Condemnation, Appropriation, Federal government, Riparian land, State governments, Relative rights, Damages, Navigable waters, Judicial decisions, Legal aspects, California.
Identifiers: Navigational servitudes, Compensation.

The recent cases of United States v Rands, 389 U S 121 (1967) and Colberg, Inc v State, 432 P 2d 3, 62 Cal Rptr 401 (1967) deal with the navigational servitude. This servitude may be defined as the federal privilege to take private property without compensation because the taking is a result of the lawful exercise of a power to which private interests have always been subject. These cases extended the federal and state power to make any value in riparian land arising from the land's proximity to a navigable body of water subject to its exercise. In the future, it is unlikely that the U S Supreme Court will draw nice distinctions between various values in riparian land which arise from the flow of a stream. Under these decisions the courts may have extended the doctrine of the navigational servitude too far. They still have not articulated convincing or well-founded reasons to justify continued adherence to this principle. (Heckerling-Fla)
W69-06876

WHEATLEY V CASS COUNTY (ACTION TO PREVENT CONSTRUCTION OF DRAINAGE CULVERT UNDER HIGHWAY).

31 NW 2d 871-875 (Iowa 1948).

Descriptors: *Iowa, *Drainage systems, *Surface drainage, *Culverts, Relative rights, Judicial decisions, Easements, Channels, Surface runoff, Surface waters, Drainage water, Grading, Water law, Public benefits, Overlying proprietors, Local governments, Legal aspects.
Identifiers: Injunctions (Prohibitory).

Plaintiffs sued to enjoin the county supervisors from constructing a culvert under a highway at an existing channel location. Such a culvert, if installed, would alter the flow of surface water. The issue was whether the doctrine of equitable estoppel would apply in this case to justify prevention of the planned installation. Plaintiffs contended that they purchased their land after the grade and drainage system along the highway had been established and that, believing that no further construction would be undertaken thereon, erected valuable improvements which would be destroyed if the culvert was established. All parties recognized the right of defendant, as dominant owner, to discharge drainage water into a natural watercourse upon its land. However, there is no right to discharge water upon the servient estate in largely increased quantities, or at a different place or in a different manner than through the natural course of drainage. The appellate court affirmed the lower court's decision in favor of the county. The court held that plaintiff had failed to prove the necessary elements of reasonable reliance, deception and change of position. Plaintiff had also failed to show that material damage would result from the contemplated course of action. (Wheeler-Fla)
W69-06877

HUNT V SMITH (DAMAGE BY OBSTRUCTION TO NATURAL FLOW).

28 NW 2d 213-223 (Iowa 1947).

Descriptors: *Iowa, *Surface waters, *Watercourses, *Obstruction to flow, Surface drainage, Riparian rights, Legal aspects, Judicial decisions, Surface runoff, Floods, Rain water, Levees, Natural flow, Streams, Flood control, Repulsion (Legal aspects), Overflow, Dams, Riddance (Legal aspects).
Identifiers: *Swales, Des Moines River.

Plaintiff sought to restrain defendant from constructing a dam on his land which would obstruct the natural flow of water and cause it to back up on plaintiff's land. The defendant contended that he had an absolute right to repel surface waters. The court distinguished surface waters from watercourses which flow in a definite channel. The court further stated that the swale which defendant had dammed was a watercourse. A swale or depression through which surface water runs is a watercourse even though such depression or swale has no defined banks. The defendant had no right to obstruct the natural flow. When water flows in a well-defined course, its flow cannot be arrested or interfered with by the landowner to the injury of the neighboring proprietors. (Shevin-Fla)
W69-06878

AMORY V COMMONWEALTH (DAMAGES FOR DIVERSION).

72 NE 2d 549-561 (Mass 1947).

Descriptors: *Massachusetts, *Riparian rights, *Reservoir construction, *Eminent domain, Dams, Flood control, Legal aspects, Judicial decisions, Navigable streams, Rivers, Reasonable use, Federal government, Public benefits, Water supply, Diversion dams, Reservoirs, Hydroelectric plants, Flood damage, Benefits.
Identifiers: Measure of damages.

Plaintiff sought an assessment of damages against the State of Massachusetts for the taking and diversion of certain water in connection with the construction of a reservoir. In determining damages where no land has been taken, the benefits accruing to the land because of the diversion of water may be taken into account; however, in order to offset damages, a benefit must be shown to have accrued directly to the land by virtue of the public improvement. Since plaintiff's land was so situated that it was unlikely that the flood control benefits provided would accrue to it, no deduction from damages was allowable. The loss sustained by other similarly situated property owners could be used as a guide in assessing the amount of loss sustained by plaintiff. (Shevin-Fla)
W69-06879

JOINT COMMISSIONS FOR ALLEVIATION OF FLOOD CONDITIONS.

N J Stat Ann secs 40:69-51 to 40:69-10 (1967).

Descriptors: *New Jersey, *Legislation, *Administrative agencies, *Flood control, Civil engineering, Cities, Local governments, Financing, Legal aspects, Regulation, Floods.

Any two or more municipalities may establish, by ordinance, a joint municipal commission for the alleviation of flood conditions. The composition of such commission shall be 5 or more members, two appointed by the governing body of each municipality and one by the governor. All will serve for 5 years. The commissioners shall serve without compensation; only their expenses shall be paid. The powers of the commission are: (1) to employ all necessary clerical assistants, agents, workmen, and servants as necessary; (2) to determine the duties and compensation of employees; (3) to engage the services of competent engineering firms; and (4) to do all other acts necessary to alleviate flood conditions and to prevent floods. Municipalities may authorize appropriations for the use of the commission. The commission may expend funds appropriated to it in order to effectuate the purposes of this act. (Heckerling-Fla)
W69-06880

POWERS TO BE EXERCISED BY GOVERNING BODY OF MUNICIPALITY.
N J Stat Ann secs 40:69-4.7 to 40:69-4.12 (1967).

Descriptors: *New Jersey, *Legislation, *Cities, *Financing, Real property, Eminent domain, Condemnation, Operation and maintenance, Repairing, Legal aspects, Contracts, Local governments, Electric power.
Identifiers: Encumbrances, Bonds.

Any municipality having made an acquisition of real property as specified in this chapter may have full use and enjoyment of such property and may construct, erect, repair, and operate the same to the extent authorized in section 6 (a). It may also purchase electric current from outside sources. Any power conferred by this chapter on a municipality shall be exervised by its governing body, which body may act without a public referendum. Acquisition of property by eminent domain or condemnation is not authorized. Negotiable bonds and notes may be issued to finance the acquisition of property covered by this act. Section 4.11 makes the power to issue bonds and notes independent of the power to acquire property or to discharge encumbrances or claims thereon, nor will it be effected by the validity or regularity of the proceedings therefor, or the authorization therefor, or the cinancing transactions out of which such bonds or notes arise. Section 4.12 makes each section of this act independent and unaffected by the invalidity of any other section. (Heckerling-Fla)
W69-06881

RIGHTS ACQUIRED BY MUNICIPALITY IN RIPARIAN LAND.

N J Stat Ann sec 40:69-46 (1967).

Descriptors: *New Jersey, *Legislation, *Riparian rights, Cities, Local governments, Utilities, Public benefits, Water resources development, Contracts, Leases, Electric power, Electric power production, Power marketing, Legal aspects, Operation and maintenance.

In regard to property or other rights acquired under the provisions of this chapter, any municipality may: (a) make use of such property and rights, and sell or furnish water, electric current, etc to any public utility in the state, or to tenants of or in the immediate vicinity of the municipality; (b) enter into contracts with any public utility or any other person for the use and operation of such rights and property; (c) lease such rights and property to any public utility company or to any other person or persons; (d) sell so much of such rights and property which the municipality may find or determine are not needed by the municipality for a public purpose; (e) exercise, in whole or in part any and all of the alternative powers and privileges herein specified with respect to the said property and rights, or any part thereof. Any contract or lease may contain such terms as the governing body of the municipality deems proper and in the public interest, and such agreement shall run for a period not exceeding 50 years. (Heckerling-Fla)
W69-06882

MUNICIPAL ACQUISITION OF WATER RIGHTS.
N J Stat Ann secs 40:69-4.1 to 40:69-4.5 (1967).

Descriptors: *New Jersey, *Legislation, *Water rights, *Local governments, Cities, Riparian rights, Navigable waters, Nonnavigable waters, Legal aspects, Financing, Contracts, Conservation.
Identifiers: Encumbrances.

Section 4.1 defines the following terms: governing body, water rights, water power, water power rights, and water power property. Any municipality may acquire real property having appurtenant thereto riparian rights, 'water rights,' 'water power,' 'water powerrights,' and 'water power property,' together with real and personal property relating thereto. Title to land acquired in this manner shall pass to and vest in the municipality in as full and ample manner as the same was theretofore held and enjoyed by the person or persons owning the same. The above described acquisition may be made for such sum or sums, and upon such terms, covenants, and conditions, as may be agreed upon, and the property may be acquired subject to leases, mortgages, liens, and other claims, which may be performed or discharged by the municipality. The municipality may hold and retain so much of the said property so acquired as may be necessary for the conservation, regulation, use, or enjoyment of such real property. Property not needed for public use may be sold, leased, or otherwise disposed of. (Heckerling-Fla)
W69-06883

IMPROVEMENT OF CHANNELS IN NAVIGABLE WATERS.

N J Stat Ann secs 40:69-3, 40:69-4 (1967).

Descriptors: *New Jersey, *Legislation, *Navigable waters, *Channel improvement, Cities, Taxes, Local governments, Financing, Legal aspects, Cost allocation, Cost sharing, Contracts.

Any municipality bordering on a navigable stream may expend moneys for deepening or widening the channel of such stream. These moneys may be raised by taxation or by the sale of bonds. Any municipality may enter into an agreement with any other municipality bordering upon a navigable stream, or with the board of chosen freeholders of the county in which such municipalities are situated, or both, for the joint expenditure of such sums of money as may be necessary to accomplish the purposes provided for in section 40:69-3 of this title. The cost of carrying out these programs may be divided between the municipalities and the county in such proportions as may be agreed upon between them. (Heckerling-Fla)
W69-06884

ELIMINATION OF NATURAL BROOKS.
N J Stat Ann secs 40:69-1, 40:69-2 (1967).

Descriptors: *New Jersey, *Legislation, *Natural streams, *Financing, Local governments, Administrative agencies, Community development, Cities, Obstruction to flow, Drains, Legal aspects, Bridges, Culverts.

The governing body of a municipality may cover any natural stream or watercourse running through it and may change the alignment or course of such stream provided the water of such stream or watercourse is properly cared for and disposed of by a drain or drainage system. Whenever any such stream or watercourse crosses a public road over which the county would be obliged by law to build a bridge or culvert and the improvement o such stream or watercourse will render such bridge or culvert unnecessary, the county may contribute to the municipality such proportion of the cost of the improvement as it shall consider fair, after approval of the improvement plans by the board of freeholders. However, the improvements shall be done by the municipality. Bonds or notes may be issued to pay for the improvements. (Heckerling-Fla)
W69-06885

WATER AND WATERCOURSES.
N J Stat Ann secs 40:69-1 to 40:69-10 (1967).

Descriptors: *New Jersey, *Legislation, *Watercourses (Legal), *Cities, Administrative agencies, Natural streams, Local governments, Water rights, Riparian rights, Utilities, Community development, Public benefits, Water resources development, Eminent domain, Taxes, Costs, Drainage systems, Lease, Contracts, Flood control, Civil engineering, Navigable waters, Channel improvement, Legal aspects, Financing.

These sections pertain to the waters and watercourses within municipalities and permit: (1) the elimination of the natural brooks or a change of their course; (2) the cost of such improvement to be shared in by the county; (3) municipalities to improve channels in navigable waters; (4) joint municipal and county action to improve channels; (5) municipalities to acquire water rights; (6) disposition of property not needed; (7) and maintenance and repair of water power sources and purchase of supplementary power. These sections also give municipalities governing power with regard to properties acquired and permit the issuance of certain bonds. These sections also provide for the establishment of joint municipal commissions for the alleviation of flood conditions and sanction appropriation of funds to the commission to carry out their purposes. (Heckerling-Fla)
W69-06886

POLLUTION AND OBSTRUCTION OF WATERS.
N J Stat Ann secs 23:5-27, 23:5-28, 23:5-29, 23:5-29.1 (1940); N J Stat Ann sec 23:5-28 (Supp 1968).

Descriptors: *New Jersey, *Legislation, *Fish conservation, *Water pollution control, Fishkill, Wil-

dlife, Explosives, Fish ladders, Fish migration, Fish barriers, Fish toxins, Balance of nature, Drainage, Screens, Land reclamation.
Identifiers: Penalties (Civil).

New Jersey included pollution and obstruction of waters control measures under the state's fish and game laws. The article contained four sections. Section 27 prohibited use of drugs or explosives for taking fish, and imposed a fine of one hundred dollars. Section 28 prohibited allowing deleterious substances to run into state waters in quantities destructive to life or disturbing the habits of fish, under penalty of two hundred dollars. Section 29 prohibited shutting off, drawing off, and screening of waters without first obtaining permission from the State, with the fine set at one hundred dollars. Section 29.1 required that a fish ladder be installed on dams constructed in migratory fish runways, with the fine set at two hundred dollars. (Wheeler-Fla)
W69-06887

LANDS, WATERS AND INTERESTS THEREIN; CONDEMNATION; OUTSTANDING INTERESTS; ENTRY AND EXAMINATION.

40 N J Stat Ann sec 60-2 (1967).

Descriptors: *New Jersey, *Local governments, *Municipal water, *Real property, Water rights, Legislation, Easements, Property values, Legal aspects, Water law, Condemnation, Eminent domain, Right-of-way, Cities, Contracts, Surveys, Data collections, Terrain analysis.

Every municipality may acquire, by gift, devise, purchase, or condemnation any real estate, and any easements, materials, waters, water rights, or other property, and any interest or estate whatsoever therein, either within or without the municipality, or any outstanding easement, right or interest in any real estate, in its possession, which its governing body shall decide to be necessary or useful for the proper exercise of any power conferred upon the municipality by this or any other law; but this section shall not operate, or be construed, to repeal or supercede any law requiring the consent of any other municipality, or of any state authority for the acquisition of any property, or rights, easements, or interests. Any such municipality proposing to acquire any such property, or any such rights, easements, or interests may enter upon the same at any time, by its engineers, surveyors and agents, to make reasonable examinations, surveys and explorations, being liable to the owner and tenants for all damage and injury. (Carruthers-Fla)
W69-06888

INTERSTATE SANITATION COMMISSION - TRI STATE COMPACT.
N J Stat Ann secs 32:18-1 to 32:18-22 (1963).

Descriptors: *New Jersey, *Water pollution control, *Interstate compacts, *Interstate commissions, pollution abatement, public health, water pollution treatment, sewage treatment, Water quality control, State governments, Water policy, Sanitation, New York, Connecticut, Administrative agencies, Legislation.

Because of the tremendous growth of population and rapid development of industry surrounding the New York harbor area, the problem of pollution has become increasingly serious. It now constitutes a grave menace to the health, welfare, and recreational facilities of people living in the area. Since control of future pollution and abatement of existing pollution is of such prime importance to the people of the area, it was felt that the problem could best be solved through cooperation of the States of New Jersey, New York and Connecticut. Consequently, an interstate compact was created to handle the problem. It set up the machinery to cope with the widespread polluted areas. Each state pledged its faithful cooperation in fulfilling the objectives of the compact. This necessitated money, legislation, and regulation from each. It is hoped that with this compact and a combined effort by each state, pollution can be controlled. (Stewart-Fla)
W69-06889

JONES V PENNSYLVANIA RR (DAMAGES CAUSED BY DIVERSION OF WATER).
75 SE 2d 103-106 (W Va 1953).

Descriptors: *West Virginia, *Diversion, *Alteration of flow, *Stream erosion, Judicial decisions, Streamflow, Damages, Obstruction to flow, Barriers, Riparian rights, Bank erosion, Floods, Legal aspects.

Defendant negligently obstructed and diverted the waters of a creek onto the plaintiffs' property causing erosion and damage to the foundations of plaintiffs' dwellings. During one spring, the stone wall forming the north bank of the creek disintegrated at certain points opposite the dwellings of the plaintiffs. Defendant, in making repairs, dumped quantities of stone blocks into these gaps, and some of these blocks extended into the stream. These obstructions caused damages by undermining and washing away parts of plaintiffs' land. The trial court returned a verdict for the plaintiffs on the basis of permanent damage; defendant appealed the verdict and assigned as error the amount of the damage award. The court held that the right of the plaintiff to recover permanent or temporary damages was determined by the nature of the obstruction and not the damage which has been suffered. The fact that the nuisance complained of had been removed prior to trial was held to be conclusive evidence of the temporary nature of the obstruction. The verdict was set aside since no evidence was offered as to the cost of repair, the expenses directly occasioned by injury, or the compensation for loss of use or rent. (Heckerling-Fla)
W69-06891

JOINT WATER SUPPLY AND WASTE DISPOSAL SYSTEMS.
Mich Comp Laws Ann secs 123.381 to 123.384 (1967).

Descriptors: *Michigan, *Waste disposal, *Water supply, *Local governments, Waste treatment, Financing, Pipelines, Contracts, Sewage disposal, Inter-agency cooperation, Legislation, Cities, Regulation.

Any local unit of government, including any county, city, village, township, school district, port district, metropolitan district or other governmental unit, may enter either singly or jointly into contracts with local units of government in another state to construct, maintain, and operate waste disposal systems including sewers, intercepters, or waste treatment facilities, and water supply systems such as pipelines, pumping, treatment and distribution facilities. Contracts may provide for location of these systems in Michigan or in another state and may be on any terms not contrary to the laws of Michigan. Contracts may also provide for waste disposal or water supply by means of facilities in either state, and local units of government may finance such systems pursuant to the laws of Michigan. (Harris-Fla)
W69-06892

FEDERAL POWER COMM'N V OREGON (FEDERAL POWER PROJECT).
349 U S 435-457 (1955).

Descriptors: *Hydroelectric plants, *Federal-state water rights conflicts, *Dams, *Oregon, Judicial decisions, Legal aspects, Streams, Alteration of flow, Reservoirs, Public benefits, Recreation, Anadromous fish, Fish conservation, Spawning, Dam construction, Public lands, Columbia River, Water storage, Water utilization, Obstruction to flow, Indian reservations, Federal government, State governments.
Identifiers: Deschutes River, Commerce power.

The Federal Power Commission issued a license permitting a power project to use waters from a United States reservation located in Oregon. The state challenged the Commission's authority. The authority to issue licenses relating to use of navigable waters of the U S springs from the Commerce Clause of the Constitution. The project is to occupy reservations, as distinguished from public lands, and thus, since title to the lands is held by the United States, no state authorization is necessary, provided the use of the water does not conflict with the vested rights of others. The Desert Lands Acts of 1866 and 1870, upon which the state relied for authority, were not applicable since they applied to public lands, not to reservations. The project has provided for a 'reregulating dam' to control interruptions in the natural flow of the stream. The state also challenged the adequacy of provisions for the conservation of anadromous fish. The fish would be cut off from their natural breeding grounds, but the power company had agreed to provide facilities for conserving the runs of anadromous fish, thus satisfying state requirements. The court found that the Commission had acted within its powers in issuing the license. (Shevin-Fla)
W69-06893

FLOOD V EARLE (WAYS OF NECESSITY FRONTING ON A NAVIGABLE LAKE).

71 A 2d 55-58 (Me 1950).

Descriptors: *Maine, *Great ponds, *Navigable waters, *Right of way, Easements, Ponds, Lakes, Public benefits, Public rights, Access routes, Legal aspects, Judicial decisions, Water law, Nonnavigable waters, Real property, Land tenure, Prescriptive rights.
Identifiers: Trespass.

An action in trespass was brought against defendant for traveling across plaintiff's land. The action was referred to a referee who found defendant and plaintiff owned adjacent cottage lots on the shore of Messalonskee Lake, a great pond. These lots had originally been part of a large farm. Defendant's predecessors in title had purchased his lot in 1906; his was the first shore lot sold. The referee ruled that since 1906 defendant and his predecessors have had an implied way of necessity for the main highway to their lot and that this way had been located in part on plaintiff's lot. Plaintiff excepted to the adoption by the court of the referee's report. The court held that if free access to the land over a public navigable water exists, a way by necessity cannot be implied. However, whether a body of water can be used as a highway is a fact question. The referee had a first hand opportunity to determine whether the lake was a navigable highway and whether defendant had free access to the lake from the main road. The court could not say that the referee was not justified in his findings. (Gabrielson-Fla)
W69-06894

WHITE V WABASH RR (ACTION FOR DAMAGES DUE TO ALLEGED DIVERSION OF SURFACE WATERS).

207 SW 2d 505-511 (Mo Ct App 1947).

Descriptors: *Missouri, *Relative rights, *Repulsion (Legal aspects), *Flow augmentation, Surface waters, Surface runoff, Judicial decisions, Rainfall-runoff relationships, Drainage systems, Natural streams, Drainage effects, Drainage engineering, Rainwater, Natural flow, Railroads, Embankments, Legislation, Local governments, Riddance (Legal aspects), Surface drainage, Damages, Diversion.

Plaintiffs brought this action to recover damages sustained because of an alleged diversion of surface waters by the defendant onto and over a farm owned by plaintiffs. Plaintiffs, contended that defendant, in constructing a spur line, had knowingly and unlawfully diverted surface waters from land adjacent to plaintiffs, and, by artificial means, cast water into a branch creek causing it to overflow

and damage plaintiffs' property. The court held that the common law rule that a landowner may guard against and repel surface water, provided he exercises reasonable care in so doing, was applicable in this jurisdiction. Each proprietor is permitted to protect his land against surface water which is the common enemy of all. Plaintiffs' contention that even under this doctrine defendant could not use artificial means to discharge the water onto a neighboring estate was overruled in light of a statute requiring railroad companies to construct suitable ditches to drain surface water into other ditches, drains, or watercourses along their roadbeds. Since plaintiffs' action was based on alleged unlawful actions, and not upon negligence, even though the volume of water in the natural watercourse was substantially increased, the suit failed. (Kelly-Fla)
W69-06895

FULTON V TOWN OF BELMONT (DAMAGE FROM OVERFLOW OF STORM DRAINS).
127 NE 2d 569-572 (Mass Sup Ct 1955).

Descriptors: *Massachusetts, *Surface drainage, *Drains, *Cities, Damages surface waters, Flood damage, Ditches, Pipes, Drainage systems, Conduits, Seepage, Percolating water, Storm drains, Drainage water, Excess water (Soils), Surface runoff, Sewers, Culverts, Judicial decisions, Legal aspects.
Identifiers: *Catch basins, Injunctions (Mandatory).

Plaintiffs were landowners in defendant town. Along the street on which plaintiffs reside was an elevation called a berm, designed to carry surface water to two catch basins at a low point in front of plaintiffs' property. One of the catch basins was drained by a pipe running under plaintiffs' property. The drain and pipe had been requested and installed by plaintiffs' predecessor in title in order to conduct the surface and percolating water from the catch basins to the rear of the property. The city furnished the pipes for the drain. Subsequent owners, including plaintiffs, allowed the drain to remain. Plaintiff sought a mandatory injunction requiring removal of the drains and a damage award for flood damage due to faulty drainage. The court held that defendant had a right to build the catch basins in order to keep the street in repair and safe for travel and that it would not be liable for any water therefrom which floods nearby land. Adjoining landowners may erect drains to prevent flooding of their land, but the city is not responsible for negligent construction thereof because the drain is in the control of the landowner. (Helwig-Fla)
W69-06896

THOMAS V HOLMES (RIGHT TO USE WELL WATER).

306 Ky 632, 208 SW 2d 969-973 (1948).

Descriptors: *Water contracts, *Wells, *Easements, *Kentucky, Water rights, Distribution, Proprietary power, Remedies, Pipelines, Pipes, Judicial decisions, Legal aspects, Usufructuary right, Damages, Relative rights, Real property, Pumping, Contracts.

Appellee, in selling the smaller of two adjoining lots, included a provision in the deed retaining the right to use water from a well situated on the lot conveyed. In 1945, this lot was conveyed to appellant. At that time, a pump, originally installed by the appellee, supplied well water to both of the lots. Later, having purchased a new pump for the well, appellant advised appellee that he would cease pumping water for appellee's use. Appellee sued to enjoin such threatened action and to recover damages for interference with his use of the well and the pump on appellant's lot. The chancellor found that appellee had a right to use the pump provided he paid one-half of the cost of the new pump and for one-half of the pump's electricity. The appellate court reversed, holding that appellee had a right to use the well water and that this right comprehended the ability to do all things reasonably necessary in order to perfect such right, to wit installing his own pump. However, there was no binding agreement allowing appellee to use appellant's pump, and the chancellor could not create such a contract for the parties. (Gabrielson-Fla)
W69-06897

FLOOD COVERAGE: NEW CHALLENGE FOR INSURANCE.
For primary bibliographic entry see Field 04A.
W69-06898

POYNTER V COUNTY OF OTTER TAIL (LIABILITIES RESULTING FROM CONSTRUCTIONS OVER WATERCOURSES).
25 NW 2d 708-718 (Minn 1947).

Descriptors: *Minnesota, *Obstruction to flow, *Floods, *Culverts, Judicial decisions, Damages, Water law, Legal aspects, Natural flow, Natural streams, Highways, Estimating, Maximum probable flood, Roads, Construction, Dams.
Identifiers: Proximate cause.

Plaintiff brought suit claiming that defendant had negligently constructed a highway culvert which obstructed the natural flow of Otter Tail River and that such obstruction was the proximate cause of damage to plaintiff's crops. Twenty-five years prior to the highway construction, a dam had been built on the river which diverted much of the river water and substantially reduced the size of a stream flowing adjacent to plaintiff's tract. It was over this stream that the highway in question was constructed. The culvert was constructed to accommodate the flow which had been constant for the past twenty-five years. The damages claimed occurred after a period of unprecedented flood. The court, stating that one who erects a structure across a waterway must adequately provide for the passage of waters reasonably expected to flow thereunder, held that defendant, in relying upon conditions existing for twenty-five years, was not liable for damages caused by obstructing the natural flow when such flow resulted from an unprecedented flood. (Holt-Fla)
W69-06900

CITY OF PASSAIC V CITY OF CLIFTON (COORDINATED FLOOD CONTROL PLANS).

14 N J 136, 101 A 2d 530-535 (1953).

Descriptors: *New Jersey, *Flood control, *Cities, *Administrative agencies, Legal aspects, Flood protection, Judicial decisions, Streams, Culverts, Flow augmentation, Runoff, Permits, Construction, Regulation, Natural flow, Relative rights, Costs.
Identifiers: Box culverts.

Plaintiff city of Passaic petitioned the Division of Water Policy and Supply to impose conditions on permits granted to defendant city of Clifton which gave authorization to construct flood control devices in a natural stream which had its source in defendant city and flowed through plaintiff city. Plaintiff stated that defendant's improvements would increase the stream's velocity of flow and that the increase would require plaintiff to make additional expenditures in connection with its own flood control plans. The petition was denied, and plaintiff appealed. The supreme court affirmed, stating that the two cities' plans provided a coordinated, practical, and economical solution to the problem of flood control on the stream. The court noted that the expense of alternatives to defendant's plan was prohibitive, while the cost of altering plaintiff's program to accommodate defendant's activities was relatively small. (Sisserson-Fla)
W69-06901

JACOBSON V KANDIYOHI (CONSTRUCTION OF A DRAINAGE DITCH).

48 NW 2d 441-445 (Minn 1951).

Descriptors: *Minnesota, *Drains, *Drainage programs, *Ditches, Local governments, Lakes, Drainage effects, Drainage systems, Dams, Judicial decisions, Legal aspects, Damages, Flooding, Water rights, Artificial watercourses, Administrative agencies, Administrative decisions, Legislation, Water levels.

This is an appeal from the district court's order vacating an order of a county board establishing a county ditch. The supreme court upheld the lower court's finding since the proposed ditch would drain into a previously completed ditch in an increased amount to the damage of adjacent property. Once a ditch system is established, the order creating it constitutes a judgment in rem. The res of the order is the watercourse and all lands damaged or benefited by it. Since the landowners involved in the construction of the first ditch were not parties to this proceeding, the order of the board was without authority. Further, under section 106.021, subd 3, the board was without power to establish the ditch without authority from the commissioner of conservation where, as in this instance, its construction would affect the level of a connected lake. Finally, a member of the county board was disclosed to be an interested party to the proceedings. (Kahle-Fla)
W69-06903

SWOBODA V RENVILLE COUNTY (PROCEEDING TO ESTABLISH VALIDITY OF PETITION FOR A DRAINAGE DITCH).
62 NW 2d 816-822 (Minn 1954).

Descriptors: *Minnesota, *Drainage systems, *Eminent domain, *Land tenure, Local governments, Relative rights, Controlled drainage, Drainage programs, Drainage water, Surface waters, Rain water, Drains, Ditches, Judicial decisions, Ravines, Artificial Watercourses, Easements, Condemnation, Riddance (Legal aspects).

This proceeding was to determine whether an amended petition filed with the county board for establishment of a drainage ditch fulfilled the statutory requirement that such a petition must bear the signatures of the owners of fifty-one per cent of the land traversed by the ditch. Appellant contended that the county had not secured the signatures of several 'owners' of land necessary to meet the percentage requirement. The court found that appellant's contentions were unfounded and held that owners of the land traversed by a natural waterway, which would become part of the drainage system without improvement to the natural waterway were not necessary parties to the signing of the petition. Their land was not to be counted in the computation of the percentage necessary to render the petition valid. The court also held that mortgagees of real estate, vendors of real estate, the county, which held a two rod easement over part of the proposed path of the ditch, and the seller of land who gave a warranty deed and guaranteed to make good to the buyers any assessment for the proposed ditch, were not 'owners' within the meaning of the statute. (Kelly-Fla)
W69-06904

WHITE CAP SEA FOODS, INC V PANZNER (RIGHT TO USE A CANAL).
1 App Div 2d 963, 150 NYS 2d 322-323 (Sup Ct 1956).

Descriptors: *New York, *Canals, *Docks, *Boats, Judicial decisions, Legal aspects, Channels, Barriers, Riparian rights, Riparian land, Riparian waters, Relative rights.
Identifiers: Catwalks, Injunctions (Prohibitory), Injunctions (Mandatory).

Plaintiff's predecessors in interest had been conveyed the right to use a canal. The lower court held that plaintiff was thus allowed to use the canal for reasonable ingress and egress of craft to his dock for loading and unloading. The defendant was required to remove a catwalk and certain poles which interfered with the plaintiff's use of the dock and was enjoined from interfering with the use of the waterway. The appellate court affirmed the lower court opinion requiring the defendant to remove the obstacles which interfered with the plaintiff's use of the dock; however, the lower court's opinion was modified to an extent by the appellate opinion which specified that plaintiff was not to use his rights in the canal in such a way as to interfere with the defendant's use. Thus, each party was to have free use of the waters as long as they did not interfere with the rights of the other. (Shevin-Fla)
W69-06906

ERA OF MILITANT FISHING JURISDICTION - STUDY OF THE FLORIDA TERRITORIAL WATERS ACT OF 1963,
Dorian Cowan.
U Miami L Rev, Vol 23, No 1, pp 160-181, Fall 1968. 22 p, 156 ref.

Descriptors: *Jurisdiction, *Florida, *Submerged Lands Act, *Ownership of beds, Littoral, Legislation, Federal jurisdiction, State jurisdiction, Continental shelf, Commercial fishing, Political aspects, International law, International waters, Boundaries (Property), Governments, Legal aspects, Water law, Shores, Fishing, Coasts.

The economic importance of off-shore waters and beds has quickened the interest of the maritime nations in extending their jurisdiction over coastal waters and beds. In the United States, the controversy is over whether the coastal states of the federal government have title to the adjoining seas and beds. Under the Federal Submerged Lands Act, title to the ocean beds was declared to be in the states. Earlier, the court had acknowledged that regulation of coastal fishing was a proper exercise of state police powers only where there was no conflict with federal regulations. Federal regulation was authorized for the purposes of commerce, national defense, and international affairs. Because unrestricted fishing was regarded as a serious threat to national resources, both the United States and the state of Florida passed laws requiring the licensing of foreign fishing vessels. The Florida Territorial Water Act of 1963 denies fishing privileges to the communist community of nations. Licenses are issued on the basis of reciprocity and friendly, neutral nations are favored. It is submitted that questions of constitutionality and conflict with federal fishing regulations the exigencies of national foreign policy will preclude a frequent application of this statute. (Gabrielson-Fla)
W69-06907

TROSCLAIR V SUPERIOR OIL CO (DAMAGES TO OYSTERS FROM OIL CONTAMINATION).
219 So 2d 278-282 (La Ct App 1969).

Descriptors: *Louisiana, *Oysters, *Oil wells, *Water pollution, Reasonable use, Leases, Drilling, Civil law, Judicial decisions, Oil wastes, Water pollution, Sources, Water pollution effects, Saline water, Reefs, Damages, Seashores, Mineral industry, Overflow, Legal aspects.

Plaintiff brought this action to recover damages for the loss of oysters through oil contamination. Plaintiff alleged that the overflow of oil and waste from a pit used in connection with defendant's drilling operations caused plaintiff's oysters to taste oily and rendered them unmarketable. The court held that the plaintiff failed to support its burden of proof as to defendant's negligence in the alleged overflow. The court found that in light of testimony to the effect that the oysters would have purged themselves of the taste in two or three weeks, plaintiff failed to sufficiently prove his damages. The court further found that even if defendant's oysters had been contaminated by oil overflow, the mineral lease held by defendants was prior in time and right to the oyster bed lease. Therefore, plaintiff would have the burden of showing that defendant had acted in an unduely negligent manner in the working of its mineral lease. (Kelly-Fla)
W69-06908

MADISON METROPOLITAN SEWERAGE DIST V COMM ON WATER POLLUTION (DISCHARGE OF SEWAGE INTO LAKE WATER).
260 Wis 229, 50 NW 2d 424-439 (1951).

Descriptors: *Wisconsin, *Sewage effluents, *Water pollution control, *Local governments, State governments, Biochemical oxygen demand, Odor-producing algae, Pollution abatement, Sewage treatment, Sewage disposal, Waste disposal, Water pollution, Lakes, Streams, Sewage, Remedies, Judicial decisions, Legal aspects.

Petitioner sewerage district, a public corporation, discharged the effluent from its sewage treatment plants into surrounding lakes. The inorganic chemicals contained in the effluent contributed substantially to the abnormal growth of a type of algae which created objectionable conditions in those lakes. Respondent, a public agency acting under powers granted by the legislature ordered petitioner to modify and improve its sewage disposal system so as to eliminate the algae nuisance. The circuit court affirmed the lower court's order and petitioner appealed. The supreme court held that the right of a municipality to empty its sewage into a stream or river was merely a legislative license revocable whenever public health and safety required. The respondent did not have to state expressly that appellant was creating a nuisance when its findings substantially demonstrated that a nuisance existed as a result of appellant's operations. (Gabrielson-Fla)
W69-06909

BUNDY V CITY OF SULLIVAN (ARTIFICIAL CONTROL OF SURFACE DRAINAGE).
1 Ill App 2d 212, 117 NE 2d 302-303 (1954).

Descriptors: *Illinois, *Natural flow, *Drainage systems, *Flood damage, Cities, Drainage water, Artificial watercourses, Natural streams, Surface waters, Surface drainage, Surface runoff, Judicial decisions, Watercourses (Legal), Ditches.

Plaintiff brought this action to recover for damages caused by the draining of water onto his land. The defendant had constructed a large artificial ditch and had connected it with another ditch which led directly onto the plaintiff's land. As a result of this network of ditches, drainage water from the defendant's streets was channeled onto the plaintiff's property. The plaintiff alleged that surface waters can not be drained through artificial channels onto the land of another. However, the court held that the decisive question was not whether the drainage system was artificial but whether it altered the general course of natural drainage. The plaintiff's complaint failed to allege that the defendant's system detrimentally altered the natural drainage. Futhermore, the plaintiff elected not to amend his complaint. Judgment for the defendant was affirmed. (Stewart-Fla)
W69-06910

MITCHEL V DOVER (BACKWATER IN SEWERAGE SYSTEM).
99 A 2d 409-412 (NH 1953).

Descriptors: *New Hampshire, *Sewers, *Backwater, *Drains, Obstruction to flow, Sewage, Local governments, Sewage disposal, Sewage effluents, Remedies, Damages, Judicial decisions, Legal aspects, Operation and maintenance.
Identifiers: Questions of fact, Causes of action, Nonsuit, Duty of care.

Plaintiffs brought this action to recover damages caused by the backing up of water and sewage from defendant's sewer. The effluents moved through plaintiffs' drains and into the basements of their stores. Defendant excepted to the denial of its motion for a nonsuit. When the judge later declared a mistrial, defendant appealed. The court, finding it to be a question of fact whether defendant's acts constituted negligence, ordered a new trial. Although an essential element of proof in plaintiffs' action involved a showing that the private drain was rightfully connected to the sewer, it was logical to infer from the previous actions of the defendant that the connection of the plaintiffs' drains with the public sewer was rightful. The court noted that the duty owed by a municipality to a person liable to be damaged by the operation of its sewerage system was that of ordinary and prudent care. (Gabrielson-Fla)
W69-06911

ELDER V DELCOUR (NONNAVIGABLE WATERS AND PRIVATE OWNERSHIP).

263 SW 2d 221-228 (Ct App Mo 1953).

Descriptors: *Missouri, *Navigable rivers, *Ownership of beds, *Riparian rights, Public rights, Surface waters, Navigation, Riparian waters, Boundaries (Property), Easements, Nonnavigable waters, Judicial decisions, Fishing, Boats, Transportation, Relative rights, Remedies, Land tenure.

Plaintiff brought this suit to establish his right to fish in a portion of a certain river. The defendant contended that, because the river was nonnavigable, he had a legal right to prevent the public from using the river where it flowed through his property. The court acknowledged that if the waters were navigable, the riparian owner was entitled to have access to and use of the waters for all purposes not inconsistent with the public easement. The court held that in order to constitute a navigable body of water, the river must be susceptible of being used for purposes of trade, travel, and commerce. However, the court found that the river was not capable of supporting any type of commercial navigation; its only useful purpose was for fishing. Consequently, the defendant had a right to restrain the public from using the river on his land. (Stewart-Fla)
W69-06913

BOWES V CITY OF CHICAGO (INTERFERENCE WITH NAVIGATION BY CONSTRUCTION OF FILTRATION PLANT).
3 Ill 2d 175, 120 NE 2d 15-32 (1954).

Descriptors: *Illinois, *Navigable waters, *Riparian rights, *Harbors, Cities, Filtration, Rivers, Boundaries (Property), River beds, Ownership of beds, Riparian waters, Federal government, State governments, Navigation, Contracts, Financing, Taxes, Construction, Judicial decisions, Legal aspects.
Identifiers: Filtration plants, Corps of engineers, Injunctions (Prohibitory), Restrictive covenants.

Appellant city sought to construct a water filtration plant in its harbor on submerged land under navigable water. It received a permit for the construction from the Army after a finding that the proposed construction would not impair navigation. Appellees were of two groups: (1) taxpayers and (2) property owners claiming violation of contract rights. Appellee taxpayers sought to have the construction enjoined on the ground that it impaired navigation. Appellee property owners sought to have it enjoined because the construction would violate certain covenants with appellant. The property owners had deeded their land and riparian rights to appellant upon the condition that the land would never be used for other than park purposes. From an order granting an injunction, appellant appealed. The court reversed holding: (1) that although the state held title to land under navigable waters in trust for the benefit of all interests, the plant would not impair navigation, and (2) that the plant was to

be built on land other than that covered by the covenants between the parties. (Helwig-Fla)
W69-06914

GREAT LAKES BASIN COMPACT.

Minn Stat Ann sec 1.21 (1967), as amended, (Supp 1968).

Descriptors: *Minnesota, *Great Lakes region, *Interstate commissions, *Interstate compacts, Great Lakes, navigation, Wildlife, Fish, Soil erosion, Soil conservation, Diversion, Water levels, Water resources development, Water policy, St Lawrence River, Fishing, Natural resources, Regulation.
Identifiers: *Great Lakes Basin Compact.

The Great Lakes River Basin Compact has as its purpose the development and conservation of the water resources of the Great Lakes Basin. The Great Lakes Commission, as created under the compact, will exercise jurisdiction over so much of the following as is included within the signatory states: Lakes Erie, Huron, Michigan, Ontario, St Clair, and Superior; the St Lawrence River; and all rivers, ponds, lakes and other watercourses connecting with the St Lawrence. The composition of the Commission is established. The signatory states agree to consider the Commission's recommendations with respect to: lake levels, pollution, navigation, fishing and wildlife resources, soil erosion, and diversion of waters from and into the Basin. Any state may withdraw from the compact after six months notice. (Kahle-Fla)
W69-06915

LEGAL STRUCTURES FOR INTERNATIONAL SUPERVISION OF WEATHER MODIFICATION TECHNIQUES,
Raphael J. Moses, and James N. Corbridge, Jr.
International Conference on Water for Peace, Vol 2, pp 410-420 (1968). 10 p, 21 ref. For 8 volume proceedings see Vol 2, No 9, Field 06B, W69-03305.

Descriptors: *International law, *Public benefits, *Treaties, *Weather modification, Legislation, Adjudication procedure, Weather, Artificial precipitation, Cloud seeding, Conservation, Droughts, Legal aspects, Meteorology, Political aspects, Rain, Water supply, International commissions.

Both social and financial benefits are derived from programs of scientific weather modification. Legal structures must be established on both the national and international level to supervise and administer weather modification programs. To date, litigation is insufficient to reveal the doctrines and concepts which the courts will employ to resolve private weather modification disputes. Conceding the fact that a case by case resolution of disputes under common law principles gives rise to a degree of uncertainty in the law, nevertheless no statutes have been passed which purport to affect the liability of operators vis-a-vis landowners. So far, federal concern has centered about investigating and coordinating weather modification rather than regulating it. Most existing law concerning weather modification has evolved from property rights and remedies for invasion of these rights. These legal structures appear to be inadequate. Since moisture-laden clouds move without regard for state or national boundaries, regulation and reparation cannot be parochial in character; a central administrative agency in each country seems appropriate. Perhaps the national government should underwrite the excess risks of prospective damage claims from large-scale weather modification schemes. The World Meteorological Organization is an existing regulatory authority for outer space, and it would be a simple matter to adapt its organizational structure to the task of regulating weather modification as well. (Scott-Fla)
W69-06916

BURKHARDT V UNITED STATES (CONGRESSIONAL AUTHORITY TO PAY DEBTS NOT OTHERWISE PROVIDED FOR IN LAW).
84 F Supp 553-560 (Ct Cl 1949).

Descriptors: *Compensation, *Dams, *Federal government, *Hydroelectric plants, Judicial decisions, Wisconsin, Condemnation, Eminent domain, Damages, Navigation, Riparian rights, Legislation, Navigable waters, Debt, United States, Water levels, Tailwater, Federal jurisdiction, Dam construction.
Identifiers: *Constitutional law.

The plaintiff brought this suit to recover compensation for the loss of power capacity in its hydroelectric plant. The loss was due to the defendant's construction of a dam for navigational purposes. The effect of the dam was to lower the water level of the river upon which the plaintiff was dependent to generate power. The trial court entered a judgment for the defendant. It held that the government operations to aid navigation often damage or interfere with advantages enjoyed by riparian owners, but the mere fact that damage has occurred confers upon the courts no power to require compensation where there is no taking of property. However, shortly after the trial court rendered its decision, Congress passed an act authorizing the Secretary of the Treasury to pay the plaintiff in full satisfaction of the claim for damages caused by the diminution of generating capacity. Such moral or equitable losses may be compensated by Congressional authority under its constitutional power to provide for the payment of debts. The court acknowledged that Congress has authority to create a new cause of action and upheld the plaintiff's claim. Without the new Congressional legislation, the plaintiff had no cause of action. (Stewart-Fla)
W69-06917

WALKER V FELMONT OIL CORP (OWNERSHIP OF BEDS AND UNDERWATER MINERAL LEASES).

136 F Supp 584-592 (W D Ky 1955).

Descriptors: *Kentucky, *Ownership of beds, *Leases, *Mineral industry, Ohio River, Patents, Judicial decisions, Exploration, Natural resources, Administrative agencies, State governments, Local governments, River beds, Riparian lands, Oil, Natural gas, Exploitation, Land tenure, Remedies, Riparian rights, Beds under water.

The plaintiffs brought this suit seeking a judgment confirming their alleged exclusive rights to oil and gas under the northern half of the Ohio River bed. Three groups held conflicting interests, each claiming the exclusive right to extract oil and gas from the river bed. All the parties conceded the sovereign power of Kentucky to permit the development of oil and gas deposits in the Ohio River bed. They disagreed sharply as to legislative acts advanced as authority. Plaintiffs' claim the rights by virtue of certain land patents purporting to convey to them title to portions of the river bed. However, the court held the patents invalid. The statute authorizing patents contemplated the conveyance of land that could be settled and lived on, not of submerged land. One group of defendants acquired the rights to the oil and gas from a county. This acquisition was also held invalid. The statute authorizing the county to grant leases applied only to sand and gravel deposits. The third defendant based his claim to the minerals on a lease from the state property and Buildings Commission. The court upheld this claim since the legislature had given the commission the power to dispose of state land not needed for public use. The court concluded that the power to sell real property includes the power to execute oil and gas leases. (Stewart-Fla)
W69-06918

DANZIGER V UNITED STATES (EMINENT DOMAIN FOR LEVEE CONSTRUCTION).
93 F Supp 70-72 (ED La 1950).

Descriptors: *Eminent domain, *Federal government, *Levees, *Flood control, Judicial decisions, Louisiana, Engineering structures, Dikes, Construction, Navigable waters, Mississippi River, Flood protection, Public rights, State governments, Easements, Compensation, Appropriation, Repairing, Legal aspects.
Identifiers: Servitudes.

The plaintiffs brought this suit to recover the value of property allegedly taken by the defendant for construction of a levee in Louisiana. The court noted that, under Louisiana law, land located along navigable waters is subject to a servitude in favor of the public for the purpose of constructing and repairing levees. However, state property is appropriated by state levee districts, not by the federal government. The taking is an exercise of the state police power. The court dismissed the action. The defendant federal government had not appropriated the property, and, thus, there was no basis for a cause of action against it. (Stewart-Fla)
W69-06919

PEOPLE V SYSTEM PROPERTIES, INC (OWNERSHIP OF THE BEDS OF NAVIGABLE WATERS).

281 App Div 433, 120 NYS 2d 269-281 (1953).

Descriptors: *New York, *Ownership of beds, *Navigable waters, *Dams, Beds under water, Beds, Navigable rivers, Riparian rights, State governments, Legislation, Judicial decisions, Navigation, Rivers, Lakes, River beds, Nonnavigable waters, Reservoirs, Lake beds, Recreation, Prescriptive rights, Legal aspects.
Identifiers: Navigable in fact, Injunctions (Prohibitory).

The people of the state, joined by several reparian owners, sought a judgment declaring the ownership of the bed of a certain navigable lake and its tributary to be in the state. The riparian owners also sought to enjoin defendant from maintaining a dam on the tributary which caused the water level of the lake to rise. The trial court found that the state had the power to regulate the lake but decided that it was in the best interests of all concerned that maintenance of the dam and regulation of the lake level be placed under court supervision. The appellate court reversed, holding that the trial court had exceeded its power and had invaded the province of the legislature. The court declared that the state owned the bed of the lake and its tributaries and had the right to control the use of the waters. The sovereign powers of the state are exercisable by the legislature alone; riparian owners cannot force exercise by the state of its reserve powers to demand removal of a dam. In addition, assertion by the riparian owners in this case of their riparian rights was barred by the running of the prescriptive period. (Helwig-Fla)
W69-06920

PASSAIC VALLEY FLOOD CONTROL COMM'N; FLOOD CONTROL.

N J Stat Ann secs 58:16-1 to 58:16A-4 (1966), as amended, (Supp 1968).

Descriptors: *New Jersey, *Flood control, *Federal government, *Project purposes, Project planning, Cost allocation, Cost repayment, Cost sharing, Federal project policy, Grants, State governments, Cities, Administrative agencies, Legislation appropriation, Financing, Regulation.

The Passaic Valley Flood Control Commission was established to include all the territory of the seven counties in the Passaic Valley. The Commission may apply to and obtain from the federal government approximately twelve million dollars for flood control purposes. The Commission was established after New Jersey decided to participate in a federal program of flood control. The state treasurer is authorized to receive moneys from both the federal government and the counties for reimbursement of

expenses incurred in connection with any federal flood control project. The state appropriated $275,000 to pay for the state's participation in the project and for certain other related activities. However, none of the appropriated money is to be made available until the federal government has authorized at least one project within the state and alloted funds to effectuate it. (Stewart-Fla)
W69-06921

FLOOD CONTROL.
N J Stat Ann secs 58:16A-6 to 58:16A-17 (1966), as amended, (Supp 1968).

Descriptors: *New Jersey, *Administrative agencies, *Federal project policy, *Flood control, State governments, Local governments, Cities, Eminent domain, Easements, Condemnation, Project purposes, Cost allocation, Cost sharing, Public utilities, Grants, Legislation, Conservation, Federal government, Project planning, Proprietary powers.

The Commissioner of Conservation shall carry out the relocation and reconstruction of water supply systems and sewer systems when such is made necessary by the construction of federal flow control projects. Amunicipality may participate in the flood control program after execution of a written stipulation that the municipality will help defray the costs. The costs of requiring a public utility to relocate its facilities shall be considered as part of the cost of the work. The commissioner has the right to acquire any property necessary to the project by gift, purchase, or condemnation. If, subsequent to the taking of a temporary easement right in property, the commissioner determines that the use of the property for project purposes is no longer necessary, he may surrender the property to the original owner and terminate the easement rights. After completion of flood control projects, and after such works have been turned over to the state by the federal government, the project works shall be maintained by the commissioner of conservation. However, the commissioner shall not exercise any of the enumerated powers until such projects have been approved by the legislature. (Stewart-Fla)
W69-06922

FLOOD HAZARD AREAS.
N J Stat Ann secs 58:16A-50 to 58:16A-54 (1966), as amended, (Supp 1968).

Descriptors: *New Jersey, *Flood protection, *Flood plains, *Administrative agencies, Public health, Safety, Flood control, Flood damage, Hazards, Cities, Floodwater, Legislation, Legal aspects, Publications, State governments.

In the interest of the health and safety of all New Jersey citizens, the Legislature empowers the Division of Water Supply to delineate and mark flood hazard areas and to coordinate the dissemination of information on floods after studying the nature and extent of flood plains. The Council of the Water Supply Division shall delineate such flood hazard areas which may constitute a threat to public health and safety. This information is to be distributed in the prescribed manner and places. The division may mark in the field any flood hazard area delineated by the council. The division may erect markers on any state property. Markers may also be placed on any county, municipal, or private property if permission is first obtained. (Stewart-Fla)
W69-06923

AERONAUTICS.
Minn Stat Ann sec 360.041 (1966), as amended, (Supp 1968).

Descriptors: *Minnesota, *Airports, *Beds, *Cities, Reclamation, Bridge construction, Public lands, Rivers, Ponds, Lakes, Streams, Water utilization, Legislation, State governments, Political aspects, Legal aspects, Breakwaters.
Identifiers: Causeways.

A municipality's power to establish and maintain airports includes the power to establish and maintain such airports in, over, and upon any public waters and submerged or reclaimed land within the state. In addition, municipalities possess the power to construct terminal buildings, landing floats, causeways, bridges, and breakwaters for approaches to, or for the protection of, such airports. (Kahle-Fla)
W69-06924

REGIONAL SANITARY SEWER DISTRICT LAW.

Minn Stat Ann secs 115.61 to 115.67 (1964), as amended, (Supp 1969).

Descriptors: *Minnesota, *Sewage districts, *Cities, *Water pollution control, Industrial wastes, Financing, Local governments, Legislation, Legal aspects, Land tenure, Administrative agencies, Supervisory control (Power), Taxes, Condemnation, Sewage, Sewage treatment, Treatment facilities, Regulation.
Identifiers: *Police power.

A sanitary sewer district shall be a municipal corporation responsible for acquiring and maintaining facilities for treatment of sewage and industrial wastes to prevent water pollution. It may sue and be sued, acquire property, be exempt from taxation, and exercise all powers granted municipalities in Minnesota. All powers shall be exercised under authority of the board of directors, which shall be exercised according to the rules of this section. The chief executive officer shall be chosen by the board and hold office on the same basis as a village manager under secs. 412.641-.751, except all appointees shall be subject to board approval. The acquisition of property by a district shall not be restricted or controlled by other local government, except under the police power. Any municipality may request annexation of its territory to a district, subject to board and Water Pollution Control Commission approval. All annexed territory shall be subject to taxation by the district. The provisions of this act are severable. (Harris-Fla)
W69-06925

WATER POLLUTION CONTROL.

Minn Stat Ann secs 115.17 (6), 115.19, 115.26 to 115.30 (1964), as amended (Supp 1968).

Descriptors: *Minnesota, *Water pollution, *Water resources development, *Administrative agencies, Public health, Legislation, Conservation, Project purposes, Public utilities, Resource development, Treatment facilities, Sewage treatment, Local governments, Septic tanks, Sewage disposal, Natural resources, Water pollution control.

The duties of the water pollution control advisory committee are to assist the Pollution Control Commission and to help formulate a statewide comprehensive policy for the conservation and development of water resources and the prevention of pollution. A sanitary district may be created to promote public health and welfare by providing an efficient sewage and disposal system. Each state congressional district may construct, improve, and maintain a system for pollution prevention and control. The district may require any person to use the disposal system. The district may regulate the construction and use of all sanitary facilities in order to protect public health. It may prohibit the use of facilities not connected with the district disposal system. A district may enter any joint project for the purpose of constructing, improving, and maintaining any system or facilities. (Stewart-Fla)
W69-06926

STATE LANDS; SALES, INVESTMENT OF PROCEEDS.
Minn Stat Ann secs 92.01, 92.04, 92.12, 92.45, 92.50 to 92.59 (1964) as amended (Supp 1968).

Descriptors: *Minnesota, *Mississippi River, *Lakes shores, *Land management, Drainage practices, Legislation, Federal government, Federal-state water rights conflicts, Lakes, Land use, Public lands, Rivers, Water policy, Legal aspects.

'State lands' or 'state public lands' are lands granted to the state by act of Congress. Minimum prices for the sale of such lands are established. Valuation of land and improvements shall be made, when necessary, by appointed state appraisers who shall also report which lands, in their opinion, should be drained. Notice requirements and provisions for separate sales of timber are set out. State lands bordering on meandered lakes or other public waters are withdrawn from sale except as they may be required by the federal government in connection with projects for the improvement of navigation on the Mississippi River. Leasing of mineral rights on unsold land is also provided for. (Kahle-Fla)
W69-06927

TOWNS, SPECIAL PROVISIONS.
Minn Stat Ann secs 368.50, 368.56 to 368.58, 368.78 (1966), as amended, (Supp 1968).

Descriptors: *Minnesota, *Water conservation, *Zoning, *Sewers, Sewage disposal, Water works, Legislation, State governments, Municipal water, Property values, Population, Reservoirs, Construction, Cities, Local governments.

Towns with populations in excess of 3000 and with assessed property values in excess of $10,000,000 may erect and maintain waterworks and sewage disposal plants. Towns with population in excess of 450,000 and assessed property value in excess of 280,000,000 or towns within 10 miles of a city of the first class may adopt zoning resolutions affecting water supply conservation upon the approval of 50 percent of those voting at a town meeting. The resolutions shall become effective 10 days after adoption unless 50 percent of the property owners within the affected area file written objection with the town clerk. Two thirds of the property owners in the affected area must approve any modification in the adopted resolution. Town boards are authorized to construct and maintain sewers for drainage purposes and to acquire land to provide for a reservoir. (Kahle-Fla)
W69-06928

NAMING LAKES, RIVERS, STREAMS, AND BODIES OF WATER.
Minn Stat Ann secs 378.01 to 378.06 (1968), as amended, (Supp 1969).

Descriptors: *Minnesota, *Lakes, *Rivers, *Local governments, Ponds, Legislation, State governments, Regulation, Administrative agencies, Legal aspects.
Identifiers: *Naming of water bodies.

The county board may be petitioned by any 15 voters of the county or the state Geographic Board to name, or to change the name, of any lake, river, stream or body of water within the county. Notice of hearing must be served on certain public officials. All interested parties may appear at the hearing which shall be held by the county board wherein the name of the body of water shall be determined. Before any action may be taken on a petition, bond must be posted by the petitioners to cover all reasonable expense to the county. Names of existing bodies of water are not to be duplicated. (Kahle-Fla)
W69-06929

GUARDING ICE-CUTTING.

Minn Stat Ann sec 378.21 (1968), as amended (Supp 1969).

Descriptors: *Minnesota, *Ice, *Hazards, *Regulation, State governments, Public rights, Public benefits, Relative rights, Legislation, Legal aspects.

Identifiers: Penalties (Criminal).

Every person cutting ice upon waters within the state must surround the openings with fences or guards until the ice has formed to a thickness of at least 6 inches. Failure to comply renders the violator guilty of a misdemeanor. (Kahle-Fla)
W69-06930

INCORPORATION, CITIES FOURTH CLASS.

Minn Stat Ann secs 411.01, 411.40 (1958), as amended, (Supp 1968).

Descriptors: *Minnesota, *Drainage, *Cities, *City planning, Local governments, Cesspools, Legislation, Municipal water, Landfills, Navigable waters, Boundaries (Surfaces), Bridges, Harbors, Levees, Tunnels, Water pollution control, Regulation, Sewers.

Villages with not less than 1000 nor more than 10,000 inhabitants may incorporate as a city of the fourth class. The council of such a city shall have the following powers and duties: to regulate the use of bridges, viaducts, tunnels, drains, sewers, and cesspools; to compel railways to keep open ditches and drains along their tracks; to restrain pollution of any waters within or adjacent to the city; to compel the owner of low ground where water is liable to collect and become stagnant to fill or drain such low places; to regulate and supervise navigable waters; to make regulations in regard to the use of vessels and opening of bridges; to appoint harbor masters and define their duties; and to prevent the removal of sand or other material from levees, embankments or boundary lines of public waters. (Kahle-Fla)
W69-06931

VILLAGE POWERS.
Minn Stat Ann secs 412.221, 412.491, 412.521 (1958), as amended, (Supp 1968).

Descriptors: *Legislation, *Local governments, *Recreation facilities, *City planning, Community development, Cities, Planning, Parks, Sewage systems, Public benefits, Health, Project planning, State governments, Navigable waters, Minnesota, Harbors, Piers, Construction, Maintenance, Regulation.

The village council shall have power to construct, alter and maintain streets, sidewalks, parks, squares, and other public grounds. The council is also empowered to regulate the water supply, waterworks, sewer system and to control the location, construction, and use of piers, docks, and wharves. The council is authorized to acquire and operate ferries across any river in the village. The council has the power to define nuisances and to provide for the prevention or abatement thereof. To effectuate the powers relating to parks and recreational facilities, the park board may employ the necessary personnel. In addition, it may construct paths, roads, buildings, and any related recreational facilities. The board may, with consent of village council, make contracts and leases for construction and operation of these facilities. Finally, the park board may provide music and free entertainment for the general public. (Stewart-Fla)
W69-06932

MUNICIPAL POWERS.
Minn Stat Ann secs 429.011, 429.021, 435.46, 435.47 (1947), as amended (Supp 1968).

Descriptors: *Minnesota, *Local governments, *Cities, *Construction, Water works, Public utilities, Maintenance, Legislation, Public benefits, Storm drains, Cities, Flood control, Water supply, Leases, Contracts, Conduits.

The term municipality is defined for purposes of this act. The council of a municipality has the power to acquire, widen, and improve any street and may construct and maintain sidewalks, curbs, and parking strips. The council is authorized to construct, extend, and maintain storm, sewer and waterworks systems and related facilities. The council may abate nuisances and drain swamps or marshes on public or private property. The council of any fourth class city may contract or enter into agreements with any adjoining municipality having a water system, in order to furnish water to its citizens. The adjoining municipality will be allowed to lay the water mains under the direction of the council. The council of any village adjacent to a first class city is authorized to purchase water from the city for re-sale to the village inhabitants provided such village has a water and sewer main connecting to the city system. (Stewart-Fla)
W69-06933

RIGHTS, POWERS, DUTIES, MUNICIPALITIES.
For primary bibliographic entry see Field 06C.
W69-06935

PLATS; COORDINATES; SURVEYS.
Minn Stat Ann sec 505.02 (1947), as amended (Supp 1968).

Descriptors: *Minnesota, *Boundaries (Property), *Boundaries (Surfaces), *Maps, Lakes, Ponds, Rivers, Streams, Legislation, Water levels, Drainage, Public utilities, Easements, Benchmarks, High water mark, Low water mark.
Identifiers: *Plats.

Regulations for setting out boundaries on plats are enacted. Where water bodies constitute a boundary, a survey line with angles and distances between all angle points and their relation to a water line is to be shown. All water bodies must be correctly located and plainly designated on the plat. Any plat including lands abutting upon a lake or stream shall show a contour line of the present shore line, water elevation, and date of survey. The highest known water level shall be indicated. Only those easements relating to public utilities and drainage need be platted. (Kahle-Fla)
W69-06936

BOATS, VESSELS; ACTIONS AGAINST.

Minn Stat Ann secs 579.01 to 579.08, 624.69 (1964), as amended (Supp 1968).

Descriptors: *Minnesota, *Boats, *Ships, *Adjudication procedure, Damages, Legislation, Judicial decisions, Navigable waters, State governments, State jurisdiction, Navigation, Legal aspects.
Identifiers: *Judgment liens, Security bonds, Execution sales.

Vessels used in navigable waters of the state are made liable for the following claims which constitute liens: (1) debts contracted by the owner or master for supplies, services, or repairs; (2) wharfage and anchorage fees; (3) damage claims resulting from the non-performance of contracts; (4) injuries to persons or property by the vessel. Provisions for the seizure and execution sale of the vessel are set forth. Upon the delivery of bond to the plaintiff in an amount adequate to cover alleged damages, the vessel may be released prior to judgment where there is court approval. The master or owner may be personally bound if the judgment remains unpaid for over 60 days. Appeals from an adverse judgment may be taken as in other cases. Actions under this chapter must be brought within one year. (Kahle-Fla)
W69-06937

PUBLIC USES FOR WHICH PRIVATE PROPERTY MAY BE TAKEN OR DAMAGED.

W Va Code Ann secs 54-1-2, 54-1-3a, 54-1-9, 54-1-10 (1966).

Descriptors: *West Virginia, *Eminent domain, *Canals, *Water supply, Natural resources, Pipelines, Reservoirs, Reservoir storage, Water conveyance, Water storage, Water resources development, Condemnation, Legal aspects, Sewers, Dams, Railroads, Industrial water, Proprietary power, Easements, Real property, Legislation, Impounded waters, Land tenure, Public benefits, Conveyance structures, Pumping.

Private property may be taken or damaged for the construction, maintenance, and operation of canals and water plants for public use. The right of eminent domain in regard to water plant facilities extends to the appropriation of property for sites for pumping stations, reservoirs, cisterns, storage dams and conveyance structures. Lands which may be flooded by the impounded waters are subject to condemnation. Any spring or stream may be taken for public use. The right of eminent domain extends to property required for construction, maintenance, and operation of sewer systems and related facilities. Any railroad company may impound and consume any and all water located on lands adjacent to its road, provided such water is not required by the owner of such property. (Katz-Fla)
W69-06938

INTERSTATE SANITATION COMMISSION.
Conn Gen Stat Ann sec 25-55 to 25-66 (1958), as amended, (Supp 1968).

Descriptors: *Connecticut, *Interstate compacts, *Interstate comm'ns, *Water resources development, Interstate rivers, Coasts, Continental margin, Streams, Public health, Public benefits, Tidal waters, Pollution abatement, Legislation, Water pollution control, Sewers, Waste disposal, Sewage sludge, Bacteria, E coli, Classification, Legal aspects, State governments, Administrative agencies, New York, New Jersey, Shellfish.

The states of Connecticut, New Jersey, and New York have entered into a tri-state compact to abate increasingly serious pollution of harbors and coastal and tidal waters. The compact provides for the creation of an Interstate Sanitation Commission comprized of five Commissioners from each state. The Commission is charged with administering pollution regulations set forth in the compact within the Interstate Sanitation District. This District consists of the major coastal, estuarial and tidal waters within the signatory states. These waters are to be classified by the Commission into two divisions. Class 'A' waters are to be used for recreational purposes, shellfish culture, or development of fish life. Sewage discharged into these waters must be kept free from all floating solids and free from 60% of all suspended solids. All other waters are to be considered Class 'B' waters, and sewage discharged into these waters is required to be free from all floating solids and free from 10% of suspended solids. The commission may bring a court action in any of the several states to enforce the provisions of this compact. (Katz-Fla)
W69-06939

FLOOD CONTROL AND BEACH EROSION: STATE ASSISTANCE.
Conn Gen Stat Ann secs 25-69 to 25-71, 25-74 (1958).

Descriptors: *Connecticut, *Floods, *Shore protection, *Flood control, Storms, Beaches, Beach erosion, High water mark, Low water mark, Ownership of beds, Dams, Tidal waters, Flood Plains, Flood walls, Flood protection, Legal aspects, Legislation, Watercourses (Legal), Tidal effects, Construction costs, Shore-line cover, Project purposes, Project benefits, Public benefits, Land tenure, State governments, Water resources development.

The state has undertaken the task of constructing protective works on or near shores and beaches within areas susceptible to damage from severe

storms accompanied by high winds, abnormally high tides and tide flooding. State protection of the exposed areas is within the public interest since the individual landowners would be unable to maintain comparable works without cooperation from abutting landowners, and since title to lands between high and low water marks is vested in the state. Encroachment limits are to be provided along waterways, and flood control features at dams and reservoirs are to be utilized as part of any flood control projects. Lands fronting on the ocean, bays, inlets, coves, or rivers in which tides occur; lands exposed to erosion through wave action; and open beach areas or lands subject to inundation because of their geographical situation are defined as exposed areas. The exposed areas are delimited by natural configuration, not political boundaries. The water resources commission is authorized to pay stated percentages for work done with local governments and private citizens, and to arrange for use of available federal and municipal facilities. (Kelly-Fla)
W69-06940

FLOOD CONTROL AND BEACH EROSION (STATE ASSISTANCE).
Conn Gen Stat Ann secs 25-76 to 27-83 (1958), as amended, (Supp 1968).

Descriptors: *Connecticut, *Water injury, *Shore protection, *Storms, Federal government, Legislation, Legal aspects, Flood control, Flood protection, Flood plains, beaches, Beach erosion, Disasters, Tidal waters, Tidal effects, Barriers, Floods, Assessments, Cities, Flood damage, Reimbursable costs, Project benefits, State governments, Right of way, Easements, Operation and maintenance.

The water resources commission is authorized to cooperate with the federal government and any municipality in the construction of small flood control systems for tidal and hurricane protection, and navigation projects including dams, dikes, flood walls, reservoir, river channel improvements and other works necessary to reduce or prevent flood damage. The commission may require reimbursement by affected municipalities. The commission, in making any assessment, should consider: (a) the extent and character of the area affected by the proposed project; (b) the economic effect of protective measures in preventing loss of life, property, and revenue; and (c) the benefit conferred upon contiguous or downstream municipalities by reason of the projects. The commission may give assurance to the federal government that the state will provide lands, easements, and necessary rights of way, without cost, for flood control projects and will maintain and operate the works after completion. The commission may require relocation of any public service company in order to secure lands or rights of way for such projects. (Kelly-Fla)
W69-06941

ECONOMIC EVALUATION OF A WATER RESOURCES DEVELOPMENT PROJECT IN A DEVELOPING NATION,
California Univ., Berkeley. Hydraulic Engineering Lab.
For primary bibliographic entry see Field 06B.
W69-06981

KIDD MFG CO V TOWN OF BLOOMFIELD, ESSEX COUNTY (EROSION OF STREAMBED THROUGH ACCELERATED FLOW).

28 N J Super 355, 100 A 2d 708-713 (1953).

Descriptors: *New Jersey, *Alteration of flow, *Bank erosion, *Stream erosion, Riparian rights, Streambeds, Streams, Local governments, Dams, Damages, Remedies, Judicial decisions, Augmentation of flow, Legal aspects, Cities, Banks, Erosion.
Identifiers: *Contributory negligence.

Plaintiff alleged that improvements made by defendants caused the flow of the stream bordering plaintiff's property to accelerate. This accelerated flow eroded the stream bed and undermined the banks of the stream adjacent to plaintiff's property, damaging a building. Plaintiff sued to recover for this damage. The court rejected defendants' argument that, since plaintiff's injuries were incidental to acts done under legislative authority, the injuries sustained were damnum absque injuria. The court also found that defendant's actions constituted misfeasance, not nonfeasance, in that it was an active wrongdoing. However, the court held that plaintiff's negligent removal of 30 or 40 tons of stone from the stream bed was a concurrent cause of the cutting away of the stream bed and of the results which followed. Therefore, plaintiff's contributory negligence barred recovery. (Gabrielson-Fla)
W69-07015

GULF REFINING CO V DAVIS (SEEPAGE FROM A SALT WATER PIT).

80 So 2d 467-470 (Miss 1955).

Descriptors: *Water storage, *Seepage, *Mississippi, *Damages, Leakage, Reservoir leakage, Saline water, Overflow, Reservoir storage, Judicial decisions, Remedies, Pit recharge, Real property, Legal aspects, Oil wells, Encroachment, Relative rights, Leases.

Plaintiff sued defendant corporation, an oil and gas lessee, for damages to his land and timber resulting from seepage and overflow from a salt water pit and from the construction of a larger pit on plaintiff's land. Following a jury verdict for plaintiff, defendant appealed. The court held that the lessee was liable for any damages caused by his wrongful acts. Whether the seepage or overflow of salt water onto plaintiff's land was the result of defendant's negligence was a question of fact for jury. However, since the court considered the jury verdict to be excessive, the case was reversed and remanded for a new trial. (Gabrielson-Fla)
W69-07016

MAGNOLIA PETROLEUM CO V WILLIAMS (PROOF OF WATER WELL CONTAMINATION FROM SALT WATER DISPOSAL PIT).
76 So 2d 365-368 (Miss 1954).

Descriptors: *Mississippi, *Saline water intrusion, *Oil wells, *Water pollution, Water wells, Land tenure, Damages, Seepage, Relative rights, Oil industry, Judicial decisions, Salinity, Waste disposal, Disposal, Water quality, Water pollution sources, Water injury.
Identifiers: *Proximate cause, *Disposal pits.

Plaintiff brought this suit for damages caused to his water well by brine water intrusion. Plaintiff maintained a water well for human and animal consumption. Defendant maintained two oil wells nearby. The oil wells produced twelve barrels of salt water each day which were emptied into a disposal pit. Other salt water disposal pits were near plaintiff's well. Defendant had no control over these other wells. Any salt water contamination would have been due to the underground movement of leakage from the disposal pits. In the trial court, plaintiff recovered $1,250. Defendant appealed on the ground that proximate cause was not shown. The Supreme Court held no recovery was possible where several causes of injury were possible and some could not be attributed to the defendant. Any judgment rendered would be based on mere conjecture since the evidence was not conclusive in showing that defendant's pit contaminated the well. (Harris-Fla)
W69-07017

HOLLIDAY V CITY OF GREENVILLE (ALTERATION OF NATURAL DRAINAGE CONDITIONS).
For primary bibliographic entry see Field 04A.
W69-07018

CARVER V TANNER (DISCHARGE OF SALT WATER INTO STREAM).

312 Ky 388, 227 SW 2d 905-906 (1950).

Descriptors: *Kentucky, *Oil wastes, *Saline water, *Discharge (Water), Mine wastes, Mine water, Flow augmentation, Judicial decisions, Water law, Legal aspects, Streamflow, Alteration of flow, Damages, Relative rights, Water pollution sources, Streams, Oil wells.
Identifiers: *Injunctions (Prohibitory).

Plaintiff brought action to enjoin defendant from discharging salt water into a stream which passed through plaintiff's land. Defendant was an oil producer, and the discharge of the salt water wastes was a necessary operation in his business. The court denied the injunction but awarded nominal damages to the plaintiff. The discharge by defendant at most increased the flow of the stream and caused plaintiff no material damage. When one party would be materially harmed by an injunction and the other party was not suffering material or substantial damage, the court will refrain from issuing the injunction. (Holt-Fla)
W69-07019

MCCABE V CITY OF PARKERSBURG (DUTY OF CITY TO MAINTAIN SEWERS SO AS NOT TO UNDERMINE LAND).

79 SE 2d 87-96 (W Va 1953).

Descriptors: *West Virginia, *Sewage, *Cities, *Land subsidence, Relative rights, Land tenure, Alteration of flow, Leakage, Damages, Storm drains, Judicial decisions, Legal aspects, Land, Soil erosion, Underseepage, Underground storage, Buildings, Maintenance.
Identifiers: *Lateral support, Negligence, Absolute liability.

Plaintiff sought damages in trespass for the undermining and sloughing away of her lot and settling of her dwelling. The damages were allegedly caused by defendant city's collection of water in its sewer system and by the wrongful casting of such water upon plaintiff's and adjacent land. Evidence showed a breakage of defendant's underground storm sewer which caused the damage. A circuit court jury returned a verdict for plaintiff. The Supreme Court of Appeals held that an owner of land was entitled to lateral support in adjacent land of his soil, but not for his buildings erected thereon. Any recovery for building damage must be based on negligence. The court further held the city had a duty of care in maintaining its sewage system, but not an absolute duty not to damage. The court ruled these distinctions were not adequately expressed in the instruction to the jury, and, therefore, the verdict included damages which were not recoverable. (Harris-Fla)
W69-07020

LAIRD, ROCK AND SMALL, INC V HARRY T CAMPBELL AND SONS (FLOODING DUE TO NEGLIGENT ROAD CONSTRUCTION).

92 A 2d 380-384 (Md 1952).

Descriptors: *Maryland, *Flooding, *Road construction, *Storm runoff, Ditches, Gullies, Rain water, Storms, Drainage, Storm drains, Dams, Diversion, Flood damage, Flash floods, Damages, Legal aspects, Judicial decisions, Drains, Excessive precipitation.
Identifiers: Contributory negligence.

Plaintiff sued the defendant for damages caused by defendant's negligence in constructing a road next to plaintiff's house. The road was constructed in such a manner that during a heavy rainstorm plaintiff's property was flooded and a wall of his house collapsed. The plaintiff contended that defendant was negligent in removing the topsoil of the road without providing any storm drainage and in cutting the gutter on the side of the road without

providing any substitute for it. By removing these drainage devices, the flow of water onto plaintiff's land was greatly increased and the damage resulted. The court rejected the defendant's claim that plaintiff was contributorily negligent, noting that a property owner has no duty to make the wall of his house strong as a dam. The court said that if flooding is caused by the negligence of a contractor in grading a road, it was not the abutting property owner's obligation to take precautions against such negligence. The court held that although the extent of the damages caused purely by defendant's negligence could not be separated from the damages caused by the severe rain, the defendant did contribute to the damages and should be held liable for them. (Shevin-Fla)
W69-07021

VENTURA V CITY OF PITTSBURGH (ACCIDENT CAUSED BY ICE FORMING ON A HIGHWAY).

159 Pa Super 279, 47 A 2d 668-671 (1946).

Descriptors: *Pennsylvania, *Highways, *Ice, *Frozen ground, Drainage, Highway icing, Snow, Slush, Storms, Streams, Surface drainage, Legal aspects, Judicial decisions, Sewers, Storm drains, Grassed waterways, Damages, Accidents, Obstruction to flow, Safety, Watersheds (Divides).
Identifiers: Automobiles.

Plaintiff sued defendant city for damages resulting from an accident caused when his automobile skidded on ice on the city's streets. The highway center line was the dividing line between the city and a borough. The court said it was the city's duty to keep its half of the road free from obstructions and in a reasonably safe condition for travel. Abutting the road was a steep hill which formed a natural watershed; surface drainage flowed down the slopes in two defined watercourses. Due to the inadequacy of a storm sewer, water was not carried from the curb to the watershed. Ice formed on both sides of the highway during the winter months. The court held that the duty rests with a municipality to provide for the drainage of water which otherwise would discharge on a highway, and that, although the borough was negligent, the city was liable for its passive negligence. The court further held that it was the province of the jury to decide if ice had formed on both sides of the road. The verdict for the plaintiff was affirmed. (Shevin-Fla)
W69-07022

COSTANZO V STATE (CONTROL OF SURFACE WATERS AND THE NATURAL FLOW DOCTRINE).
For primary bibliographic entry see Field 04A.
W69-07023

MORROW V HARRISON COUNTY (SUIT TO ENJOIN CONSTRUCTION OF A DRAINAGE DITCH).

64 NW 2d 52-61 (Iowa 1954).

Descriptors: *Iowa, *Drainage, *Ditches, *Drainage effects, Land reclamation, Drainage engineering, Channels, Drainage districts, Outlets, Sewers, Surface waters, Rivers, Streams, Silts, Construction, Storm drains, Overflow, Roads, Rainfall, Levees, Legislation, Missouri River, Legal aspects, Judicial decisions, Flow augmentation, Excessive precipitation, Remedies, Discharge (Water), Repairing.
Identifiers: Injunctions (Prohibitory).

Plaintiffs sought to enjoin construction of an open drainage ditch by the defendants. They contended that the new ditch would divert water from a river and cause an overflow which would damage their land. The defendants had determined that the ditch was necessary to drain water which had accumulated in the area due to heavy rainfall. The court held that the plaintiffs failed to prove that substantial injury would result if injunctive relief were denied. It noted that a party is not entitled to relief merely because water is sent over a more direct course to the same destination it formerly reached. It was defendants' duty to properly maintain the ditch, and it is assumed that this duty will be performed. The defendant was authorized by statute to construct the ditch, and the statute is to be liberally construed to promote reclamation of wet and overflow lands. Defendant's use of a natural stream was properly considered a repair to a drainage system. No increased volume of water will be cast upon the plaintiffs' lands. The plaintiffs were not entitled to an injunction. (Shevin-Fla)
W69-07024

ATKINSON V UNITED STATES (FEDERAL LIABILITY FOR DAM BACKWATER).

68 F Supp 99-103 (D Minn 1946).

Descriptors: *Minnesota, *Remedies, *Federal government, *Backwater, Riparian rights, Damages, Legislation, Eminent domain, Dams, Overflow, Rivers, Mississippi River, Streams, Navigable waters, Judicial decisions, Legal aspects, Flood damage, United States, High water mark, Compensation.
Identifiers: Tucker Act.

Petitioners brought claims for damages under the Tucker Act, alleging that the building of Dam No 8 on the Mississippi River and the erection of a dam on Pine Creek caused water to back-up and rise above its normal levels thus damaging plaintiffs' lands. The court determined that the claims for damages were barred by the statute of limitations. It is well settled that the government is not required to make any compensation for damage to lands by reason of the raising of a navigable river up to the ordinary high water mark. Occasional damage caused by heavy rains cannot form the basis for an action against the Government if the river, in its normal state, does not rise above the ordinary high water mark. Actions brought under the Tucker Act must be brought within six years from the date of the alleged taking. Since any taking of land would have had to occur when the waters were raised to their normal level, and since this event occurred over six years before this action was brought, no relief was available. (Gabrielson-Fla)
W69-07025

SEA HARBOR CORP V G AND M DREDGING CO (DAMAGES FROM DREDGING).

105 NYS 2d 497-499 (Sup Ct 1951).

Descriptors: *New York, *Dredging, *Damages, *Compensation, Channel improvement, Islands, Navigable waters, Streams, Federal government, Administrative agencies, Judicial decisions, Legal aspects.
Identifiers: *Injunctions (Prohibitory).

Plaintiff brought action for damages and injunctive relief against defendant holding company (holder of a government permit authorizing dredging operations). Plaintiff was the owner of an island, part of which had fallen into a creek due to negligent dredging operations by defendant. The court denied plaintiff the immediate injunction since defendant had ceased all dredging activity pending this suit. The court also denied a permanent injunction since the work was being done pursuant to a War Department permit. The court did award damages to the plaintiff since, even if the federal government ordered the dredging, and assuming an absence of negligence, nevertheless, under the 5th amendment of the Federal Constitution, just compensation would have to be paid. Here there was no question that defendant's dredging operations were negligently performed. Thus, there was no doubt that damages should be awarded to plaintiff. (Logan-Fla)
W69-07026

HURD V STATE (NEGLIGENT DISCHARGE OF CANAL WATER).
For primary bibliographic entry see Field 04A.
W69-07027

PURDY V CITY OF NEWBURGH (REGULATION OF RIPARIAN RIGHTS WITH RESPECT TO WATER SUPPLY).

113 NYS 2d 376-382 (Sup Ct 1952).

Descriptors: *New York, *Riparian rights, *Water supply, *Municipal water, Water quality, Water quality control, Pollutants, Water pollution control, Easements, Condemnation, Legislation, Public benefits, Recreation, Lakes, Ponds, Streams, Local governments, Judicial decisions, Legal aspects, Relative rights, Regulation.
Identifiers: Declaratory judgments.

Plaintiffs brought action against the city for a declaratory judgment regarding the parties' legal rights with reference to the application of Health Department rules and regulations to plaintiffs' riparian land. Plaintiffs' land was situated on a natural stream flowing between a lake and a pond; both of these bodies of water were sources of the city's water supply. The regulations in question prohibit pollution of the stream as well as bathing or fishing in it. Plaintiffs, in a prior action, obtained an injunction against the city preventing violation of any riparian rights. Plaintiffs now contend that the city must institute condemnation proceedings and obtain an easement to enforce the regulations; they contend that a failure to do so will constitute an abandonment of the regulations since the rules and the possibility of condemnation constitute a cloud on plaintiffs' title which has caused a depreciation in property value. The court dismissed the action, holding: (1) there was no controversy between the parties; (2) the legislature must determine when the rules are to be abandoned; and (3) the court had power only to order payment for property already taken, not order property to be taken. (Kahle-Fla)
W69-07028

L A DARLING CO V WATER RESOURCES COMM'N (ADMINISTRATIVE REGULATION OF POLLUTION).

341 Mich 654, 67 NW 2d 890-897 (1955).

Descriptors: *Michigan, *Pollution abatement, *Adjudication procedure, *Groundwater, Lagoons, Chromium, Industrial wastes, Water law, Legal aspects, Judicial decisions, Administrative decisions, Jurisdiction, Administrative agencies, Public health, Water quality control, Water pollution sources, Water pollution control, Regulation.
Identifiers: Constitutional law, Due process (Procedural).

Appellant discharged wastes from its electroplating process into 2 infiltration lagoons provided by the City of Bronson. Appellee, following a conference with appellant in which witnesses were not sworn, examined, or cross-examined, issued an order directing appellant to install a suitable waste disposal system which would render its discharges noninjurious to public health. Appellee based its decision on the findings of its sanitary engineer who indicated that the city's groundwater source was in danger of becoming polluted due to the condition of the lagoons. Appellant had questioned appellee's jurisdiction over groundwater, but the court found that the statute creating the commission also gave it jurisdiction over pollution of groundwater. The court held the order of the commission invalid, however, since the hearing afforded appellant had violated the due process clauses of the Federal and State Constitutions. The commission could only require the abatement of groundwater pollution after the defendant had been given a hearing as required by law, in which he would have the opportunity to examine and cross-examine witnesses. (Holt-Fla)
W69-07029

PETITION OF DREOSCH (PIPELINE EASEMENTS).

47 NW 2d 106-112 (Minn 1951).

Descriptors: *Minnesota, *Eminent domain, *Easements, *Pipelines, *Drainage, Ditches, Remedies, Judicial decisions, Legal aspects, Water law, Construction costs, Drainage district, Compensation, Damages, Easements, Right of way, Relative rights.

Respondent had established a county ditch to provide drainage for over 10,000 acres. Appellant owned a pipeline which would intersect with the drainage ditch in three places. Rights of way for the pipeline had been purchased from private property owners before construction was begun. In order to construct the ditch, appellant's pipeline would have to be lowered or raised at the three points of intersection. Since such action would involve substantial expense, appellant sought to recover damages in an eminent domain proceeding. Damages were awarded to appellant. The court held that an easement or right of way was 'property' within the meaning of the Minnesota constitutional provision prohibiting the taking of private property for a public use without just compensation. To force the appellant to incur the expense of raising or lowering the pipeline in order to facilitate construction of the drainage canal was tantamount to a taking of private property for a public purpose. Because Minnesota had a statute which provided for damages resulting from eminent domain proceedings, the principle of damnum absque injuria was inapplicable. (Holt-Fla)
W69-07030

NEWPORT HOMEWATER CO V PENNSYLVANIA PUBLIC UTILITY COMM'N (PURCHASE OF PRIVATE WATERWORKS BY MUNICIPALITY).
174 Pa Super 522, 102 A 2d 221-227 (1954).

Descriptors: *Pennsylvania, *Public utilities, *Water works, *Administrative agencies, Cost analysis, Water distribution (Applied), Cities, State governments, Water management (Applied), Legislation, Permits, Water rights, Economics, Legal aspects, Judicial decisions.

The Borough of Newport applied to the defendant Commission for a certificate of public convenience to enable it to purchase plaintiff water company. The plaintiff contended that the price that the defendant would be required to pay was in excess of the available assets and borrowing capacity of the borough. After a careful examination of the financial structure of the Borough, the Public Utilities Commission granted the certificate, holding that the Borough's borrowing capacity was sufficient to meet the purchase price under its construction of the statutory price formula. Acknowledging that it was within the province of the Commission to make such a determination, the court affirmed the order granting the certificate of public convenience. (Stewart-Fla)
W69-07031

RUTLEDGE V UNION ELECTRIC CO OF MISSOURI (RIGHT TO FLOOD CONFERRED BY DEED).
280 SW 2d 670-74 (Mo 1955) (per curiam).

Descriptors: *Missouri, *Easements, *Dams, *Flooding, Flood damage, Flood water, Judicial decisions, Legal aspects, Damages, Backwater, Dam design, Reservoirs, Water levels, Water rights, Lakes, Power plants.
Identifiers: Deeds.

Landowners brought action against a power company for damages to land and personal property by reason of intentional flooding of land behind a dam. The power company defended on the ground that it possessed an easement to flood the land in question. The trial judge set aside a verdict and judgment for the landowners and entered a judgment for the power company. The Supreme Court of Missouri affirmed the decision of the trial judge on the ground that unlimited right to flood the land was granted in defendant's deed. A provision in an easement accompanying the deed which stated that the dam would be designed so as to hold the water level at approximately 660 feet above the mean sea level referred to the normal lake level and not to maximum level. Therefore, this provision in no way limited the right to flood granted elsewhere in the deed. (Watson-Fla)
W69-07032

HURLEY V AM ENKA CORP (REASONABLE RIPARIAN USE CONCERNING DAMS).

93 F Supp 98-103 (E D Tenn 1950).

Descriptors: *Tennessee, *Dams, *River regulation, *Competing uses, Reasonable use, Services, Ditches, Water pollution, Legal aspects, Judicial decisions, Flood control, Water control, Boundaries (Property), Riparian rights, Public benefits, Hydraulic structures, Industrial plants, Access routes.
Identifiers: Nolichucky River.

Plaintiff owned a tract of land which was divided by a shallow slough of water during part of each year. The depth of this water varied, but testimony indicated that the water was generally a few inches deep. Occasionally the slough was completely dry. The defendant constructed a dam downstream from plaintiff's land causing the water level in the river and slough to rise, inhibiting plaintiff's access to the 'island' half of his property. Defendant contended that the laws of Tennessee limited the title of a riparian owner along a navigable stream to the land above the low water mark. Consequently, defendant contended that the plaintiff had no interest in the isolated portion of his tract as it was below the low water mark. The court determined that the slough was not the low water mark of the stream and held that the plaintiff's tract had been damaged. Damages were awarded accordingly. (Katz-Fla)
W69-07033

DELAWARE RIVER ABOVE AND BELOW TRENTON FALLS WITHIN JURISDICTION OF NEW JERSEY AND PENNSYLVANIA.

N J Stat Ann secs 23:9-3 to 23:9-5, 23:9-9 to 23:9-11, 23:9-15, 23:9-17 to 23:9-21 (1940); N J Stat Ann secs 23:9-6 to 23:9-8, 23:9-12 to 23:9-14, 23:9-16 (Supp 1968).

Descriptors: *Fishing, *Delaware River, *Nets, *Water pollution control, Fish conservation, Sport fish, Bait fishing, Riparian rights, Water law, Legislation, Fish toxins, Fish management, Sport fishing, Public rights, Commercial fishing, Fishing gear, Explosives, New Jersey, Pennsylvania, Navigable waters, Low water mark, Interstate rivers, Water resources development, Legal aspects.
Identifiers: *Penalties (Criminal), *Interstate cooperation, Fishing seasons, Trenton Falls.

Within the boundaries prescribed, taking or catching, or attempting to take or catch, any game, food, or bait fish may be done only as set forth in the State Fish and Game Code or the provisions of this article. Impeding navigation with any fishing net or device is prohibited. The interference with any fishing device being lawfully used, or its destruction without cause, and the allowance of any poison, explosive, or other deleterious substance to enter the waters described in this section, unless all practicable means of avoiding pollution have been taken is also prohibited. The provisions of this article are enforceable through arrest and prosecution by any authorized officer of New Jersey or Pennsylvania. Such arrest may be made on the waters described or on the shores of those waters if such are within the jurisdiction of either state. (Harris-Fla)
W69-07034

WATERS AFFECTED BY ARTICLE; COMMON RIGHTS TO FISH; GAME, BAIT AND FOOD FISH DEFINED.

N J Stat Ann secs 23:9-3 to 23:9-5 (1940).

Descriptors: *New Jersey, *Pennsylvania, *Sport fishing, *Bait fishing, Water law, Legislation, Public rights, Fishing, Low water mark, Fish managment, Commercial fishing, Navigable waters, Fish conservation, Bass, Sunfishes, Pikes, Trout, Sport fish, Delaware River, Legal aspects.
Identifiers: *Game fish, Trenton Falls.

The provisions in this act apply only to propagation, catching, taking, protection and destruction of fish in the waters of the Delaware River above and below Trenton Falls lying between the commonwealth of Pennsylvania and the state of New Jersey. Inhabitants of Pennsylvania and New Jersey shall enjoy a common right of fishery through the waters of the Delaware River, above and below Trenton Falls, between low water mark on each side of the river between the states, except as valid private fishing rights have been granted by either state. The term 'game fish' includes the varieties of bass enumerated by this section, the crappie, pike perch, pike, pickerel, or any form of trout. The term 'bait fish' means any species of minnows, killifishes, and stone catfish. The term 'food fish' includes all other varieties of fish. (Harris-Fla)
W69-07035

TAKING STURGEON; TAKING FOOD FISH WITH SCINE OR GILL NET; FINE AND FORFEITURE; USE OF CERTAIN NETS PROHIBITED; FINE AND FORFEITURE; PROHIBITED HOURS FOR FISHING; FINE AND FORFEITURE; USE OF PARALLEL NETS PROHIBITED.

N J Stat Ann secs 23:9-9 to 23:9-11, 23:9-15 (1940), as amended, (Supp 1968).

Descriptors: *Fish conservation, *Sport fish, *Bait fishing, *Nets, Riparian rights, Fish managment, Sport fishing, Public rights, Commercial fishing, Fishing gear, Legislation, Navigable waters, Herrings, Suckers, Delaware River, Regulation, Legal aspects.
Identifiers: Sturgeon, Trenton Falls, Penalties (Criminal).

Taking or attempting to take sturgeon, herring, suckers, or any other food fish above Trenton Falls with a scine or gill net, other than as prescribed by law, is prohibited. Violators of this section are subject to fine and forfeiture of all appliances. The use of a pound net or any anchored or fastened net in the Delaware River above or below Trenton Falls, and the use of any net to take fish within one-half mile of the mouth of any stream emptying into the Delaware River above or below Trenton Falls, is also prohibited. Violators are subject to fine and the forfeiture of all appliances. The use of a net between 2:00 p m Saturday and midnight Sunday above or below Trenton Falls, the use of a net set approximately parallel to the shore of the Delaware River below Trenton Falls or the use of any net in such a manner as to impede navigation is punishable by $100 fine and the forfeiture of all appliances. (Harris-Fla)
W69-07036

INTERFERENCE WITH OR INJURY TO NETS; USE OF EXPLOSIVES OR POISONOUS MATTER; POLLUTION OF WATERS; PURCHASE, SALE OR POSSESSION OF FISH EXCEPT DURING LAWFUL PERIOD PROHIBITED.

N J Stat Ann secs 23:9-17 to 23:9-19 (1940).

Descriptors: *New Jersey, *Fish toxins, *Explosives, *Water pollution control, Fish management, Commercial fishing, Nets, Fishing gear, Riparian rights, Sport fish, Legislation, Regulation, Water pollution sources.
Identifiers: Food fish, Proof.

The wilful interference with or destruction of nets being lawfully used, without reasonable cause, or the drifting of a gill net over the waters of a shore fishery below Trenton Falls while the hauling seine is being used is punishable by a $20 fine. The placing of any explosive substance in the Delaware River for the purpose of killing fish, or allowing any deleterious matter to be emptied into said waters without the use of every practicable means to prevent pollution is prohibited. In prosecuting the above mentioned offense, it is not necessary to prove that such substances have actually caused the death of any particular fish. Violators are subject to $200 fine. The purchase, sale, or possession of any freshly killed game or food fish, except during the lawful period for catching the same and for 6 days after expiration of that period, is punishable by a fine of $10 for each fish. (Harris-Fla)
W69-07037

CONCURRENT JURISDICTION OF STATES; PROCEDURE FOR VIOLATIONS -- ARREST AND PUNISHMENT OF VIOLATIONS; INTERFERENCE WITH OFFICERS; MANNER AND MEANS OF FISHING FOR GAME FISH.

N J Stat Ann secs 23:9-20, 20.1, 21 (1940), as amended, N J Stat Ann sec 23:9-6 (Supp 1968).

Descriptors: *New Jersey, *Pennsylvania, *State jurisdiction, *Sport fishing, Fishing gear, Legislation, Sunfishes, White perch, Yellow perch, Navigable waters, Shores, Fish management, Fish conservation, Legal aspects, Regulation.
Identifiers: Penalties (Criminal).

Pennsylvania and New Jersey have concurrent jurisdiction over violations of this article, within their respective jurisdictions. When Pennsylvania enacts a similar fish law any game protector, fish warden, or other person authorized, shall have the power to arrest any offender on any part of the Delaware River lying between the states or the shores thereof and to take such offender to trial in the state of the violation. The attempt to prevent an arrest by an authorized person for violation of fish laws or to prevent the carrying into effect any provisions of this article is punishable by a fine of $100. Fishing for game fish, sunfish, or white or yellow perch may only be done by methods prescribed in the state fish and game code. If no method is prescribed, only rods and lines, hand lines, or trolling lines and artificial bait may be used. The number of devices may not exceed the prescriptions in the code, or if not prescribed, 2 of 1 or the other devices named. Violators are subject to a $20 fine. (Harris-Fla)
W69-07038

MEANS OF FISHING FOR BAITFISH, FOOD FISH; GAME FISH; SEASON; CATCHING FISH WITH LINES.

N J Stat Ann secs 23:9-7, 8, 12 (Supp 1968).

Descriptors: *New Jersey, *Bait fishing, *Commercial fishing, *Sport fishing, Fish conservation, Fish management, Legislation, Fishing gear, Regulation, Trout, Legal aspects.
Identifiers: *Food fish, *Trenton Falls, *Fishing seasons, Penalties (Criminal).

No person may fish for bait or food fish except with devices prescribed by the State Fish and Game Code, or, if none are prescribed, with devices enumerated in this section. Any violator using a device other than those prescribed in the code or in this section subject to a fine of $20.00. The number of devices used in fishing for food fish may not exceed that number prescribed in the Code, or, if none is prescribed, 3 of 1 or the other device named. The use of a prohibited device, or the use of a legal device contrary to promulgated regulations, is punishable by a fine of $20.00. Catching food fish as prescribed by section 23:9-6 is lawful at any time of the year. Fishing or taking of game fish must be as provided in the State Fish and Game Code. Any form of trout may only be taken between April 15 and July 31 unless otherwise provided in the code. Violators are punishable by a fine of $10.00 for each fish taken. (Harris-Fla)
W69-07039

BAG LIMIT ON GAME FISH; USE OF EELPOTS AND FYKE NETS; SIZE OF CERTAIN FISH.

N J Stat Ann secs 23:9-13, 14, 16 (Supp 1968).

Descriptors: *New Jersey, *Fish conservation, *Nets, *Sport fish, Regulation, Legal aspects, State governments, Legislation, Carp, Catfishes, Suckers, Eels, Fishing gear, Legal aspects.
Identifiers: *Bag limits, *Eelpots, *Fyke nets, Fishing season, Penalties (Criminal).

The taking, killing, or possession of more gamefish than the limit prescribed by the code for one day is punishable by a fine of $20.00 for each fish in excess of the limit. The use of eelpots and fyke nets without wings during any period prescribed in the State Fish and Game Code, or, if no period is prescribed, from June 1, to July 1 is unlawful. However, it is lawful to use such devices as prescribed by the code or from July 1 to May 31 to catch carp, catfish, eels and suckers. All other fish caught must be returned unharmed immediately to the water. The device must meet the specifications of this section of the code. Violators are subject to $20.00 fine and forfeiture. No person may catch or attempt to catch fish of greater weight or less length than provided by the State Fish and Game Code or this section. Any such fish caught must be returned immediately to the water. Nothing in this section shall be construed so as to prevent fishery authorities of New Jersey or Pennsylvania from capturing fish of any size from any waters at any time of year or in any manner for purposes of propagation or stocking. Violators shall be subject to a fine of $10.00 for each fish caught and in possession. (Harris-Fla)
W69-07040

POWERS AND DUTIES OF COMMISSIONER OF CONSERVATION.

N Y Unconsol Laws secs 1305, 1307 (McKinney Supp 1968).

Descriptors: *New York, *Flood control, *Eminent domain, *Appropriation, State governments, Federal government, Condemnation, Projects, State jurisdiction, Cost allocation, Federal project policy, Project planning, Flooding, Easements, Administrative agencies, Compensation, Legislation, Legal aspects, Adjudication procedure, Land regulation.

The Commissioner of Conservation is authorized to supervise the state's participation in a federal flood control program. He may perform any acts necessary to carry out the authorized projects and shall conform to the regulations of the federal government. The Commissioner shall acquire by appropriation any property or interest necessary for the successful completion of the projects. Upon filing with the Department of State a description of any property necessary for a project, the officers of the state may immediately enter upon and take possession of the land. Each owner affected by the appropriation shall be served with notice and the fact that such service has been accomplished shall be recorded. An occupant of any land appropriated may be removed after proper proceedings. The Commissioner may settle claims for the value of the property appropriated, or the owner may file a claim in the court of claims. The Commissioner or his agents may enter any property for the purpose of making tests or surveys in connection with a project. (Helwig-Fla)
W69-07041

STRICKLAND V STATE (HIGHWAY CONSTRUCTION AND SURFACE WATER DRAINAGE).
166 NYS 2d 870-873 (Ct Cl 1957).

Descriptors: *New York, *Road construction, *Drainage systems, *Prescriptive rights, Storm runoff, Rainfall, Flood damage, Culverts, Surface waters, Water rights, Diversion, Natural flow, Judicial decisions, Excessive precipitation, Obstruction to flow, Discharge (Water), Legal aspects.
Identifiers: *Negligence, *Burden of proof, *Proximate cause.

Claimant sought to recover for damages allegedly caused when the state collected and discharged surface water upon his land from a drainage system on a state highway. Claimant's property lay partly in the natural line of drainage and directly in line with any overflow from the state's highway culvert. After heavy rains, the culvert became plugged with debris of unknown origin, and claimant's land became flooded. Claimant gave no notice to the state of any defect in the culvert. The court of claims held that the state's surface water drainage course had existed uninterrupted, adverse, and under claim of right for 15 years; this being so the state was held to have acquired a prescriptive right to maintain the drains but not to cause flooding to plaintiff's land. The court felt that since the lands had previously been flooded, and since claimant had not proved negligent construction of the highways or diversion of surface waters caused by improperly constructed or plugged culverts, the claimant failed to prove negligence or a causal relationship. The court directed a verdict for the state. (Harris-Fla)
W69-07042

COOPER V CITY OF READING (LIABILITY UNDER ATTRACTIVE NUISANCE DOCTRINE FOR MAINTENANCE OF DRAINAGE POOL).

392 Pa 452, 140 A 2d 792-799 (1958).

Descriptors: *Pennsylvania, *Ponds, *Drowning, *Legal aspects, Safety, Hazards, Cities, Drainage systems, Storm drains, Dry beds, Ownership of beds, Easements, Barriers, Local governments, Encroachment, Judicial decisions.
Identifiers: *Attractive nuisance, *Negligence, *Liability, *Legal duty, Fencing, Knowledge, Governmental functions.

Defendant city's storm sewer drainage system discharged water into an abandoned canal bed, forming a pool pursuant to an easement. A portion of the pool encroached upon defendant railroad's property. The pool was unfenced and children frequently played there. One drowning had previously occurred. Plaintiff's children drowned when ice on the pool broke at its deepest point. The trial court granted judgment for defendant notwithstanding verdicts for plaintiff. The supreme court held the attractive nuisance doctrine to apply, but felt defendant railroad did not have, nor should it have had, knowledge that the pool had encroached upon its land. The city was held to have exercised sufficient control over the canal bed by exercise of its easement to fill the pool with water, and had a duty to make it a safe place. The court felt the peril presented by the illusive depth at the pool's center could not have been known by children, and that the city's purpose in maintaining the unfenced pool did not outweigh the danger to the children. The court found no government function in the passive allowance of the pool, and reinstated the verdict against defendant city. (Harris-Fla)
W69-07044

DIVISION OF WATERS, SOILS AND MINERALS.

Minn Stat Ann secs 105.37 to 105.55, 105.60 to 105.64, 105.71 to 105.81 (1964), as amended, (Supp 1968).

Descriptors: *Legislation, *Administrative agencies, *Minnesota, *Water resources development, Hydraulic structures, Dams, Adjudication procedure, Stop logs, Reservoirs, Water conveyance, Waterworks, Water supply, Water conservation, Water utilization, Legal aspects, State

governments, Permits, Regulation, Impounded waters.

Minnesota regards all state waters which are capable of beneficial public use to be public waters subject to state control. The Commissioner of Conservation is charged with development of a water resources program. The Commissioner's duties include establishing the high water level of lakes and issuing permits to construct dams. It is a misdemeanor for any person or agency to use public waters without approval of the Commissioner. The Director of the Waters Division of the Conservation Department is required by statute to be an engineer skilled in hydraulics. The Director is responsible for physical surveys including surface and groundwater resource evaluation. Easements for the use of stoplogs to provide water project efficiency may be procured by the Commissioner. Operation of state owned hydraulic works may be assigned to local governments. Prior to diverting or draining waters, mining interests are required to obtain a permit from the Commissioner. A State Water Resources Board is to be appointed by the governor. (Katz-Fla)
W69-07045

WATER RESOURCES, CONSERVATION.
Minn Stat Ann secs 105.37 to 105.41 (1964_0, as amended, (Supp 1968).

Descriptors: *Minnesota, *Legislation, *Administrative agencies, *Drains, Ditches, Runoff, Surface waters, Groundwater, Base flow, Tiles, Precipitation excess, Water resources development, Hydraulic structures, Adjudication procedure, Water conveyance, Waterworks, Water supply, Water conservation, Water utilization, Legal aspects, State governments, Permits, Regulations, Impounded wastes, Dams, Reservoirs, Condemnation, Eminent domain.

Subject to existing rights, all waters capable of substantial beneficial public use are declared to be public waters subject to state control. The Commissioner shall devise a water resources conservation program contemplating conservation, allocation, and development of all waters within the state, surface and underground, in the public interest. The Commissioner shall be guided by such a program in consideration of issuance of permits for construction of dams, reservoirs, and other control structures. The Commissioner is empowered to acquire property to implement this program by condemnation. The Water Division Director shall make such engineering surveys and reports as the Commissioner shall direct. A report on all future public ditches shall be filed with the Director. The Director is required to publish runoff data and information concerning the capacity of the drains within the state. The Director is empowered to conduct inspections of manufacturing plants. The Director is authorized to appear as an expert witness on behalf of the state in any matter affecting water within the state. (Katz-Fla)
W69-07046

WATER RESOURCES, CONSERVATION.
Minn Stat Ann secs 105.41 to 105.45 (1964), as amended, (Supp 1968).

Descriptors: *Minnesota, *Legislation, *Administrative agencies, *Water resources development, Hydraulic structures, Dams, Adjudication procedure, Stoplogs, Reservoirs, Water conveyance, Waterworks, Water supply, Water conservation, Water utilization, Legal aspects, State governments, Permits, Regulation, Impounded waters, Eminent domain, Condemnation.

It is unlawful for any person or legal person to use or appropriate any surface or groundwaters of the state without a permit from the Commissioner. Such permits may be subject to conditions attached by the Commissioner in the public interests. Permit holders must obtain permission before increasing authorized water usage. It is unlawful for any person or the state to construct, abandon, or reconstruct any reservoir or dam without a permit from the Commissioner. The Commissioner, upon request, shall affix the natural high water mark of any public body of water. All permits required under this section shall be accompanied with specific plans, maps, and specifications concerning the proposed water appropriation. The Commissioner may, in his discretion, waive public hearing on permit applications. A disappointed party may demand a hearing within ten days from the denial of his application. Such hearings shall be public, and adequate notice of time and place shall be afforded all parties. Any issued permit is subject to cancellation in the public interest. (Katz-Fla)
W69-07047

WATER RESOURCES, CONSERVATION.
Minn Stat Ann secs 105.45 to 105.60 (1946), as amended, (Supp 1968).

Descriptors: *Minnesota, *Legislation, *Administrative agencies, *Water resources development, Hydraulic structures, Dams, Adjudication procedure, Stoplogs, Reservoirs, Water conveyance, Waterworks, Water supply, Water conservation, Water utilization, Legal aspects, State governments, Permits, Regulation, Impounded waters, Public benefits, Navigation, Wildlife conservation.

All orders of the Commissioner shall be based on findings of fact made on substantial evidence. The Commissioner shall grant or deny permit applications in furtherance of the public interest. Notice of such orders shall be served by publication or mail within 60 days after the completion of the hearing. The Commissioner shall fix the time within which all authorized construction must be completed or within which any appropriation must be completed; such period shall not exceed 5 years. Any party in interest may appeal from any determination of the Commissioner to the county district court within 30 days after notice of such order. The Commissioner, in the interest of navigation, water supply, wildlife conservation or in the general public interest may construct and maintain any waterworks necessary to maintain a uniform water level. The Commissioner is in charge of all state dams. The Commissioner may require artesian well owners to prevent wastes. Any violation of this statute is a misdemeanor. (Katz-Fla)
W69-07048

STOPLOGS, EASEMENTS.
Minn Stat Ann secs 105.60 to 105.71 (1964), as amended, (Supp 1968).

Descriptors: *Minnesota, *Legislation, *Administrative agencies, *Water resources development, Hydraulic structures, Dams, Adjudication procedures, Stoplogs, Reservoirs, Waterworks, Water conveyance, Water supply, Water conservation, Water utilization, Legal aspects, State governments, Permits, Regulation, Impounded waters, Public benefits.

In order to provide effective regulation of the waters controlled by the Lac Qui Parle water control project, the Commissioner is authorized to acquire, by purchase or condemnation, all easements that may be necessary for the use of stoplogs. No more than five stoplogs may be used at any one dam, and stoplogs will not be placed from freeze until 1 April of each year. The Commissioner may exercise and use easements or rights so acquired for stoplog use upon the commencement of condemnation proceedings. The acquisition costs of such easements shall be born by the water control project. The Commissioner may transfer operation of a state dam to any authorized political subdivision of the state in the furtherance of public interest. Permits allowing drainage, diversion, control, or use of waters necessary in certain mining operations may be issued by the Commissioner. Permits to mining concerns shall issue only upon a showing that no other economical and feasible mode of extraction is available and that such operations shall be in the public interest. Any permit so issued shall be irrevocable for the term thereof. (Katz-Fla)
W69-07049

WATER RESOURCES BOARD; IMPOUNDING AND DIVERSION OF DRAINAGE SYSTEM WATERS.
Minn Stat Ann secs 105.71 to 105.81 (1964), as amended (Supp 1968).

Descriptors: *Minnesota, *Legislation, *Administrative agencies, *Water resources development, Hydraulic structures, Dams, Adjudication procedure, Stoplogs, Reservoirs, Water conveyance, Waterworks, Water supply, Water conservation, Water utilization, Legal aspects, State governments, Permits, Regulation, Impounded waters.

A Water Resources Board is to be appointed by the governor. The Board shall serve as a forum in which inconsistencies in state water law and policy may be resolved. The Board will also determine questions of state water policy de novo where necessary. The Board's intervention is invoked by petition requesting referral of a question of water policy involved in a proceeding. A properly filed petition abates the proceeding until the Board acts. The Board shall act as quickly as possible in convening a public hearing and in formulating its recommendations. To facilitate Board determinations, the Board may subpoena necessary witnesses and records. Upon proper petition and posting of bond, the county board may approve local projects involving impoundment and diversion of drainage system waters. (Katz-Fla)
W69-07050

POWER TO ACQUIRE LAND, CONSTRUCT AND EQUIP SEWERAGE SYSTEM.
Conn Gen Stat Ann sec 7-247 (1960).

Descriptors: *Connecticut, *Sewage districts, *Condemnation, *Cities, Sewage, Sewage disposal, Sewage treatment, Sewers, Wastes, Environmental sanitation, Drainage systems, Storm drains, Regulation, Administrative agencies, Management, Storm runoff, Real property, Right of way, Eminent domain, Contracts, Control, Legislation, Local governments, Legal aspects.

Any city may acquire, construct, and operate a sewerage system or systems. For that purpose, the city may enter upon and acquire property by purchase, condemnation, or other means. Cities may establish rules for the operation of the system, including regulation of discharge of sewage or any storm drain runoff into the system which they feel will adversely affect its operation. Cities may contract with any person or with any other city to provide or obtain sewerage system services for any sewage. The sewer authority shall: (1) establish rules for the transaction of its business; (2) keep records of its proceedings; and (3) designate an officer to be the custodian of its books. (Shevin-Fla)
W69-07051

STREAM OBSTRUCTION AND DUMPING.
Conn Gen Stat Ann secs 19-312 to 19-315 (1960), as amended, (Supp 1968).

Descriptors: *Connecticut, *Natural flow, *Obstruction to flow, *Alteration of flow, Legislation, Sedimentation, Watercourses (Legal), Natural streams, Navigation, Navigable waters, Docks, Piers, Islands, Landfills, Wastes, Sludge, Damages, Barriers, Deposition (Sediments), Water pollution. Identifiers: *Nuisances.

Any person who intentionally deposits in any watercourse material which will be naturally carried to another's land and cause damage thereto shall pay double damages unless he removes such substance within a reasonable time after notice of

the damage. Any person who obstructs navigation by placing foreign objects in navigable waters shall be fined and ordered to remove such substances. If he fails to do so within thirty days, the substance may be removed at his expense. This section does not apply to wharves. Any person who unlawfully sinks any material in the Connecticut River so as to obstruct or divert the natural flow, shall be fined and ordered to remove the material. (Stewart-Fla)
W69-07052

ALTERATION OF HIGHWAYS.
For primary bibliographic entry see Field 04A.
W69-07053

LEGAL CONTROL OF THERMAL POLLUTION,
Max N. Edwards.
Nat Resources Lawyer, Vol 11, No 1, pp 1-6, Jan 1969. 6 p, 6 ref.

Descriptors: *Electric powerplants, *Thermal pollution, *Aquatic environment, *Water quality control, Electric power industry, Electric power demand, Thermal water, Nuclear powerplants, Heated water, Nuclear energy, Cooling, Cooling water, Water temperature, Ecology, Oxygen, Technology, Pollution, River flow, Turbulence, Water quality act, Federal government, Recreation, Permits, Legislation, Flow augmentation, Planning standards, Administrative agencies, Legal aspects.
Identifiers: *Waste heat discharge, Fed Water Pollution Control Act, Injunctions (Mandatory), Injunctions (Prohibitory).

Thermal pollution is rapidly becoming a serious problem. As the nation's need for more electric utility plants becomes greater, and the industry's use of nuclear powered generating plants becomes more widespread, thermal pollution caused by waste heat discharges becomes more prevalent. Four solutions are possible: (1) reduce the heat wasted by increased efficiency; (2) make constructive use of the heat; (3) adjust the duration of a temperature deviation; and, (4) manage the environment so as to reduce the impact of heat. Standards for water quality control do exist; however, the Federal Water Pollution Control Act does not allow for injunctive relief to abate the threatened thermal pollution. The courts expect public uses to be considered before federal licenses are granted. Several proposals have been made to create a new authority to assure compliance with water quality standards before licensing. The three major proposals are: (1) review of compliance with thermal standards by the licensing agency; (2) recommendations of standards by the Department of the Interior; and, (3) certification of compliance by the Department of Interior. Regardless of the procedure followed, thermal pollution is an immediate critical, multi-faceted problem requiring attention. This country requires abundant power, but the tapping of new power sources must be achieved with minimum pollution of our streams and rivers. (Shevin-Fla)
W69-07054

BRIDGE CONSTRUCTION AND MAINTENANCE.

Conn Gen Stat Ann secs 13a-90, 13a-94, 13a-99, 13a-101, 13a-112 (1958), as amended, (Supp 1968).

Descriptors: *Connecticut, *Bridge construction, *Cost allocation, *Maintenance, Artificial watercourses, Highways, Legislation, Repairing, Cities, Navigable waters, State governments, Administrative agencies, Flood control, Projects, Regulation, Bridges, Civil engineering, Cost sharing, Streams, Transportation, Construction costs, Equitable apportionment, Embankments.

Any bridge or passageway over an artificial watercourse built before May 10, 1957 and located on a highway maintained by the Commissioner of Highways shall be maintained by the owner of the watercourse. If the highway and bridge require expansion or reconstruction, the cost shall be charged to the state and the Commissioner shall thereafter maintain the bridge. Any structures or embankments to be built over or adjacent to streams in connection with state highway improvement projects and flood control shall conform to the requirements of the water resources commission for sizes and location of waterways. Towns shall, within their respective limits, build and repair all necessary highways and bridges unless the duty belongs to some particular person. Any bridge or passageway over an artificial watercourse on a highway not maintained by the Commissioner shall be constructed and maintained by the owner; however, if the town finds the bridge to have become unsafe for the traveling public, it can order the construction of a new bridge and pay an equitable portion of the reconstruction cost. No bridge without a draw shall be built across waters navigated by commercial vessels whose passage would be impeded by such bridge. (Stewart-Fla)
W69-07055

CONTRACTS FOR ABATEMENT OF POLLUTION.
W Va Code Ann sec 16-13-22b (1966), as amended, (Supp 1968).

Descriptors: *West Virginia, *Cities, *Pollution abatement, *Industrial wastes, Sewage treatment, Legislation, Public benefits, Water pollution, Cost allocation, Sewage disposal, Water pollution treatment, Water pollution sources, Treatment facilities, Contracts, Maintenance, Public health.

When necessary to protect public health, a municipality may contract with any industrial establishment for the operation of sewerage facilities to abate or reduce water pollution caused by industrial wastes. The industrial establishment shall periodically pay the municipality amounts sufficient to compensate it for the costs of operating and maintaining sewerage facilities. (Stewart-Fla)
W69-07056

GRANT V UNITED STATES (SEWAGE DISPOSAL IN TIDAL WATERS).
192 F 2d 482-486 (4th Cir 1951).

Descriptors: *North Carolina, *Sewage disposal, *Oysters, *Tidal waters, Ownership of beds, Sewage, Natural use, Chemical wastes, Federal government, Remedies, Judicial decisions, Legal aspects, United States, Leases, Legislation, Damages, Relative rights.
Identifiers: Oyster beds.

Plaintiffs leased certain oyster beds from the State of North Carolina. They brought action against the United States under a special act of Congress conferring a right of action for damage to such lands caused by the dumping of untreated sewage and laundry waste into the tidal waters in which the lands were situated. The district court entered a decree for the United States, and plaintiff appealed. This court found that the intent of the legislature in enacting the special legislation was that the United States should be held to the same degree of liability as a private person or a municipality when disposing of pollutants in tidal waters. Under state law, the rule was that there was no liability for dumping sewage into tidal waters since there was ordinarily no private ownership of lands beneath such waters. However, when the state, representing the public, leased land beneath tidal waters for the cultivation of oysters, the right of the public to dump sewage was restricted; only such sewage as would not harm the rights of the lessee could thereafter be emptied into the waters. The United States was held liable. (Gabrielson-Fla)
W69-07057

HERBERT V T L JAMES AND CO (CONDEMNATION WITHOUT COMPENSATION).

224 La 498, 70 So 2d 102-109 (La 1954).

Descriptors: *Highways, *Riparian rights, *Louisiana, *State governments, Navigable waters, Navigation, Streams, Damages, Remedies, Judicial decisions, Legal aspects, Right of way, Condemnation, Compensation, Real property, Land, Public benefits.
Identifiers: *Servitudes, Injunctions (Prohibitory).

Plaintiff owned land on a navigable stream. Across the front of this land, close to and parallel to the stream, lay a state highway. Defendants, in widening this highway, cut a road bed across plaintiff's front yard. Plaintiff sought injunctive relief and an award of damages. Plaintiff argued that defendants could not widen the highway without granting compensation for the land taken. Defendants based the legality of their actions on certain state statutes which provided that lands bordering on navigable streams owe servitudes for general road purposes without any right of compensation. The trial court issued the injunction, and defendants appealed. The court of appeals reversed, and plaintiff appealed. The supreme court, after examining the history of the statutes, reinstated the decision of the trial court. The court held that the servitude imposed by the statutes was not intended to serve any public purpose other than that incident to the nature, navigable character, or use of the stream. The decision to widen this highway was made in furtherance of other objectives. (Gabrielson-Fla)
W69-07058

CITY OF MIAMI BEACH V HOGAN (CONDEMNATION OF OCEAN-FRONT PROPERTY).

63 So 2d 493-495 (Fla 1953).

Descriptors: *Florida, *Condemnation, *Oceans, *Beaches, Recreation facilities, Atlantic Ocean, Cities, Condemnation value, Navigable waters, Parks, Recreation, Legislation, Zoning, Land use, High water mark, Low water mark, Legal aspects, Judicial decisions, Shores, Public rights, Local governments.
Identifiers: Injunctions (Prohibitory).

The city filed a petition condemning respondent's ocean front property for parks purposes pursuant to a city ordinance. Respondent filed suit attacking the reasonableness of the ordinance and sought to enjoin the city from condemning her property. The lower court held for the respondent, and certiorari was granted. The supreme court stated that a regularly enacted ordinance is presumed to be valid until the contrary is shown and that the burden of establishing invalidity rests on the complaining party. In reference to zoning ordinances, the court stated that it will not substitute its judgment for that of the city; the ordinance will be sustained unless it is shown to be clearly unreasonable. The court held that the people of a municipality have a right to use the ocean and the land lying between the high water mark and the low water mark for the purposes generally recognized. They further said that, if all the ocean front property of Miami Beach was devoted to hotel purposes, the citizens could not use the ocean unless they became a guest at a hotel. The decision of the lower court was reversed in favor of the city. (Shevin-Fla)
W69-07059

RIGHTS, POWERS, DUTIES; SEVERAL POLITICAL SUBDIVISIONS.

Minn Stat Ann secs 471.05, 471.06, 471.10, 471.11 (1963), as amended, (Supp 1968).

Descriptors: *Minnesota, *Legislation, *Docks, *Administrative agencies, Navigable waters, Structures, Organizations, Cooperatives, Transportation, Rivers, Inland waterways, Navigation, Excavation, Construction, Eminent domain, Con-

demnation, Abatement, Regulation, Legal aspects, Local governments.

In Minnesota, any village which has no railroad connections, is situated adjacent to navigable waters and is dependent upon such navigable waters for transportation, may combine with other towns in the vicinity to create an organization for the purpose of building, maintaining, and operating one or more docks or wharves on such waters. No such territory may organize unless when so combined it will constitute one continguous body of land. An election to determine whether to form such an organization and whether to finance it through the issuance of bonds shall be called by the various towns and villages upon petition signed by at least one per cent of the voters of such communities. Notice and conduct of such elections is regulated. If the proposition is approved by the various communities, a commission, comprised of various chief officials, shall be formed. The commission shall have the authority to purchase sites and to conduct the operation. The governing body of any political subdivision may regulate the maintenance or abandonment of dangerous excavations and may provide penalties for violations. Such installation may be defined as a public nuisance and thus be made subject to laws relating to the abatement of nuisances generally. (Wheeler-Fla)
W69-07060

ELECTRICAL.
Minn Stat Ann secs 455.11, 455.15 to 455.22 (1963) as amended (Supp 1968).

Descriptors: *Minnesota, *Easements, *Dams, *Hydroelectric plants, Cities, Structures, Powerplants, Electric powerplants, Industrial plants, Electric power, Electric power production, Hydroelectric power, Water levels, Regulation, Eminent domain, Public utilities, Flow, Government finance, Pricing, Electric power rates.
Identifiers: Corporations (Public).

Any city of the third class owning and operating a power dam for purposes of generating electricity for municipal use may acquire necessary flowage rights under the power of eminent domain over and upon any property for the purposes of increasing the height of the dam. Any city situated upon a river may form a public corporation to develop water power facilities to supply electricity to the city and state institutions therein. Adjacent cities shall be invited to unite in securing the organization; however, acceptance of such invitation by the adjacent city is not a prerequisite for proceeding with formation of such corporation. The manner of organizing the corporation and its objects, purposes, election of officers, rates, and bond issuance are regulated. The corporation is empowered to acquire developed water power near the cities, to acquire necessary lands and rights, and to provide itself with suitable plants and with necessary means of distribution. (Wheeler-Fla)
W69-07061

LICENSES, TAKING OF GAME AND FISH.

Minn Stat Ann secs 98.45, 98.47, 98.48 to 98.52 (1947) as amended (Supp 1968).

Descriptors: *Minnesota, *Wildlife, *Permits, *Fishing, Hunting, Birds, Natural resources, Administrative agencies, Local governments, State governments, Wildlife conservation, Wildlife management, Small animals (Mammals), Trapping, Furbearers, Recreation, Fish, Legislation, Legal aspects, Costs.

Except as permitted by statute, no person may take, buy, sell, transport, or possess protected wild animals without a proper license. Such license must be carried on the person of the individual while engaged in acts covered by the license. Licensing of aliens, non-residents, and non-resident students are provided for in special provisions. Certain exemptions to the licensing law are set out. The Commissioner may issue special permits for such activities as scientific expeditions, field dog trials, taking certain animals as pets and establishing, rifle ranges. The procedure for application, issuance, and revocation of licenses and permits are set out. (Helwig-Fla)
W69-07062

COMMERCIAL FISHING.
Minn Stat Ann secs 102.23 to 102.30 (1964) as amended (Supp 1968).

Descriptors: *Minnesota, *Commercial fishing, *Legislation, *Regulation, Fishing, Commercial shellfishing, Commercial fish, Fisheries, Fishing gear, Freshwater fish, International waters, Shellfish, Clams, Mussels, Fish, Rivers, Lakes, Administrative agencies, Legal aspects, Nets, Equipment, Seasonal.
Identifiers: Penalties (Criminal).

Mussels, clams, and fish, taken according to law, may be bought and sold during open seasons plus 7 days; if frozen during the season, they may be bought and sold anytime. The regulations as to the size and number of mussels allowed to be taken and as to the equipment permitted to be used in their taking are set out. The equipment and method restrictions for taking commercial fish in certain rivers and lakes are listed. No person shall knowingly obstruct or interfere with any commercial fishing operation, remove any fish from nets, or injure nets. The Commissioner of Conservation may authorize and make rules concerning the transportation, sale, and disposal of fish taken within the Red Lake Indian Reservation. (Helwig-Fla)
W69-07063

DRAINAGE SYSTEMS.

Minn Stat Ann secs 106.641 to 106.673 (1964), as amended, (Supp 1968).

Descriptors: *Minnesota, *Drainage systems, *Ditches, *Public benefits, Conservation, Drainage, Drainage practices, Flood control, Laterals, Pipes, Streams, Wildlife, Surface waters, Repulsion (Legal aspects), Legislation, State governments, Local governments, Highways, Construction, Legal aspects, Maintenance, Diversion, Obstruction to flow, Assessments, Repairing, Compensation, Ditch grass.
Identifiers: Penalties (Criminal).

Any person who obstructs or injures any public drainage system, who wilfully alters any stakes set in any drainage system or who digs without authority any drain which outlets into any public drain shall be guilty of a misdemeanor. After the construction of any ditch system, if waters are diverted from any land being assessed for such systems so that the land no longer benefits from the system, the owner of such land may petition for removal from the system. When a drainage ditch no longer benefits the public, owners of land assessed for its construction may petition for its abandonment. After abandonment of a ditch, the county shall no longer maintain or repair it. Any authority charged with determining the public utility of any drainage system will give due consideration to conservation measures. Any drainage system affecting land owned for purposes of conservation of natural resources shall be permitted to exist only if beneficial to the public interest. Ditches within a drainage system may be planted with a permanent grass. (Helwig-Fla)
W69-07064

HIGHWAYS AND PORTAGES.

Minn Stat Ann secs 163.111, 163.13 (1960) as amended (Supp 1968).

Descriptors: *Minnesota, *Highways, *Local governments, *Drainage systems, Roads, Public benefits, Legislation, Legal aspects, Relative rights, Regulation, Administrative agencies, Land tenure, Ditches.

When considering a petition for vacation of a county highway, the county board shall determine whether the lateral ditches are essential for drainage of adjacent land. If the drainage is necessary for the general health, the board may cause vacation of the highway. Any person who owns land in a county may petition for establishment, alteration, or vacation of a county highway or portage. After a hearing, the board shall, by resolution, make a determination whether to grant or deny such petition. If the petition is denied, petitioner may appeal, and there shall be a trial de novo. (Helwig-Fla)
W69-07065

BRIDGES ACROSS DIVERSION CHANNELS.
Minn Stat Ann sec 163.15 (1960) as amended (Supp 1968).

Descriptors: *Diversion structures, *Access routes, *Navigable waters, *Minnesota, Legislation, Legal aspects, Roads, Highways, Bridges, Streams, Local governments, State governments, Easements, Relative rights.

If any county diverts the channel of a navigable stream in order to improve a road, and the diverted stream crosses private property so as to deprive the owner of access to the road, such owner may grant to the county a perpetual easement across the property and the county shall build a bridge thereon. (Helwig-Fla)
W69-07066

DRAINAGES SYSTEMS AFFECTING HIGHWAYS; ALTERATIONS.
Minn Stat Ann sec 163.17 (1960) as amended (Supp 1968).

Descriptors: *Minnesota, *Highways, *Operation and maintenance, *Drainage systems, Ditches, Legislation, Legal aspects, Alteration of flow, Public benefits, Relative rights, Administrative agencies, Construction.

If it is desirable in the construction or maintenance of a highway to make a minor alteration in a public ditch system, the county board by resolution or district court by order, after a hearing, may authorize such alteration. (Helwig-Fla)
W69-07067

WITKE V STATE CONSERVATION COMM'N (TAXATION OF PUBLIC USE OF PUBLIC WATERS).
56 NW 2d 582-589 (Iowa 1953).

Descriptors: *Iowa, *Navigable waters, *Taxes, *Public rights, Riparian rights, Judicial decisions, Public benefits, Administrative agencies, State governments, Permits, Boats, Lakes, Transportation, Compensation, Navigation, Water rights, Competing uses, Regulation, Legislation, Legal aspects, Financing.
Identifiers: *Constitutional law, Due process.

Plaintiff brought suit to have a state statute declared unconstitutional. The statute provided that no one could operate a commercial concession on any state-owned lands or waters without first obtaining a permit and paying an appropriate fee. Plaintiff owned several boats which he operated as taxis on the navigable waters of a lake. The state held the title to the lake waters but only in the capacity as trustee for the public. Plaintiff contended that the tax deprived a citizen of property without due process of law. The court upheld a judgment for the plaintiff, ruling that, since the waters are public, any person has a right to use the waters for whatever purpose he desired, as long as such use did not interfere with the rights of others. A state may not sell the right to use public waters.

However, the court did rule that, if the state has improved the waterway or provided other facilities, a reasonable fee may be exacted in order to pay for such improvements. (Stewart-Fla)
W69-07068

KIMBLE V ANDERSON-TULLY CO (TITLE TO ACCRETION).

16 F R D 502-507 (E D Ark 1955).

Descriptors: *Arkansas, *Accretion (Legal aspects), *Riparian rights, *Islands, Mississippi River, Rivers, Navigable waters, Judicial decisions, Remedies, Legal aspects, Boundaries (Property), State governments, Riparian land.
Identifiers: *Ownership of accretion.

Plaintiff brought action to establish title to land allegedly formed by accretion. The land in question had become attached to an island which plaintiff owned. Defendant contended that the accreted land formed an independent island. Defendant filed a motion for summary judgment based on a plea of res judicata. The court denied the motion on the ground that a close and doubtful question of law was presented. No Arkansas cases were directly on point. In discussing the Arkansas policy towards accreted lands, the court noted that accretions to riparian lands are private property belonging to the riparian owners; lands which form islands in a navigable stream become, subject to a few exceptions, property of the state. (Gabrielson-Fla)
W69-07069

KIRSCHMAN V COCHRAN (TITLE TO ACCRETION).

241 SW 2d 9-13 (Mo 1951).

Descriptors: *Accretion (Legal aspects), *Land tenure, *Missouri, *Riparian land, Judicial decisions, Banks, Riparian rights, Navigable waters, Shorelines, Land forming, Legal aspects, Boundaries, Properties, Relative rights.
Identifiers: *Adverse possession, Ejectment.

Plaintiff brought action to quiet title to property and to eject defendant. The dispute concerned the ownership of lands formed by accretion. Plaintiff contended that he held title to the accretion by virtue of his title to the main land, which he had acquired by adverse possession. Defendant conceded that plaintiff had good title to the mainland but contended that such fact had no bearing on the question of ownership of accretion. The court held for the plaintiff, ruling that accretion belongs to the land to which it attaches. It follows that the title to the mainland, whether such title was acquired by deed or by adverse possession, carries with it title to any accretions. If the mainland had been unoccupied, the accretion would have been in constructive possession of the true owner; however, since the land was held by adverse possession, the accretion was in actual possession of the adverse owner. It is not necessary that the accretion be held for the statutory period required to acquire title by adverse possession. Once title to the mainland by adverse possession is obtained, title to accretion follows. (Stewart-Fla)
W69-07070

STATE V NICHOLS (OWNERSHIP OF SHORELINES AND RIPARIAN RIGHTS).

44 NW 2d 49-59 (Iowa 1950).

Descriptors: *Iowa, *Nonnavigable waters, *Riparian land, *Land tenure, Ownership of beds, Taxes, Judicial decisions, State governments, Watercourses, High water mark, Public lands, Navigable waters, Lake shores, Lakes, Riparian rights, Federal government, Land use, Real property, Legal aspects, Boundaries (Property).
Identifiers: *Quiet title.

Plaintiff brought suit to vacate a decree which quieted title to certain shore land in the name of the defendant. Plaintiff contended that the shore lands were part of the bed of a navigable body of water. Since the state holds title to the beds of all navigable waters in trust for the public, plaintiff also claimed title to the surrounding shore lands. Defendant based his claim on a tax deed. Furthermore, defendant contended that since he was in possession, had built a house, and paid all taxes on the property, plaintiff must recover on the strength of his own title and not on a defect in defendant's title. The court found the waters adjacent to the tract to be nonnavigable. Under Iowa law, an owner of riparian land bordering on a nonnavigable lake has title up to the high water mark but not to the beds. Since this is so, the court affirmed a judgment for the defendant, ruling that he had title to the shore lands. (Stewart-Fla)
W69-07071

MAYOR AND CITY COUNCIL OF BALTIMORE V CANTON CO OF BALTIMORE (RIGHT TO BUILD PIERS).

47 A 2d 775-782 (Md 1946).

Descriptors: *Maryland, *Riparian rights, *Local governments, *Ownership of beds, Navigable waters, Piers, Docks, Permits, Littoral, Navigation, State governments, Rivers, Harbors, Compensation, Judicial decisions, Legal aspects, Remedies, Damages, Accretion (Legal aspects).

Plaintiff granted permits to defendant allowing extensions of certain piers built into navigable waters, subject to inspection and minor privilege charges. When defendant did not pay these annual charges, plaintiff brought suit claiming the right to make such charges. The trial court entered judgment for defendant, and plaintiff appealed. The court held plaintiff had no right or power to exact these minor privilege charges. It found that the riparian owner possessed a vested right to make improvements on his piers. He could not lawfully be deprived of this right without his consent. Plaintiff had no right to demand compensation for the privilege of exercising that right since in this case, the power to exact compensation for the exercise of a right would have been tantamount to the power to destroy such right. (Gabrielson-Fla)
W69-07072

IN RE HADLOCK (CONSTRUCTION OF A FISHING WEIR IN A MUNICIPAL COVE).
48 A 2d 628-631 (Me 1946).

Descriptors: *Maine, *Riparian rights, *Navigable waters, *Fishing, Obstruction to flow, Ownership of beds, Recreation, Relative rights, Shores, Tides, Low water mark, Legislation, Fisheries, Tidal waters, Cities, Legal aspects, Judicial decisions, Local governments, Permits, Riparian land, Boundaries (Property).
Identifiers: *Fish weir.

Petitioner had applied to the Municipal Officers of the town for a license to erect a fish weir or trap in front of his shore in the tidewaters of a cove within the town limits. After being denied such a license, he obtained a court order directing the Officers to issue the permit. An owner of shore property bordering the cove filed a bill of exceptions. The court held that rights appurtenant to property bordering on tidal waters stop at the low water mark and that the rights intended to be safeguarded by the license requirements are those such as unobstructed navigation and fishing and not intangible rights such as unobstructed view or sightly prospects. The court held that, under the statute in question, the ruling of the lower court ordering issuance of the license was correct, and the exceptions were dismissed. (Shevin-Fla)
W69-07073

BERGER V TOWN OF GUILFORD (BEACH OWNERSHIP).

136 Conn 71, 68 A 2d 371-378 (1949).

Descriptors: *Connecticut, *Boundaries (Property), *Land tenure, *High water mark, Public lands, Beaches, Judicial decisions, Recreation, Cities, Local governments, Easements, Seashores, Highways, Public benefits, Land use, Legal aspects.
Identifiers: *Quiet title.

Plaintiff brought suit for a judicial determination of the ownership of a beach area which defendant claimed was public. A highway ran through the property parallel to the beach. Defendant claimed that plaintiff's property ended at the highway while plaintiff claimed that his title extended to the high water mark, giving him ownership of the beach. Plaintiff's predecessor in title owned to the high water mark. The existence of the highway and its related incidents did not affect property boundaries; rather, it merely provided the public with an easement to the beach after plaintiff had acquiesced in public use of his beach. Only recently had private ownership become important. The court entered a judgment upholding the title of plaintiff. The only way plaintiff could have relinquished his title to the public was by dedication. However, in order to establish a dedication, the requisite subjective intent must be established by competent evidence. The fact that the beach had established a reputation in the community as 'public' was of no consequence. The title was vested in the plaintiff. (Stewart-Fla)
W69-07074

STATE V CALDWELL (SPECIAL ASSESSMENTS TO DEFRAY DRAINAGE COSTS).

35 So 2d 642-646 (Fla 1948).

Descriptors: *Florida, *Land reclamation, *Assessments, *Financing, Taxes, State governments, Legal aspects, Conservation, Land tenure, Land development, Judicial decisions, Legislation, Experimental farms, Agricultural engineering, Watersheds (Basins), Drainage engineering, Drainage programs.
Identifiers: *Conservancy districts, *Experiment stations, *Florida Internal Improvement Fund, Writ of mandamus.

A 1919 enactment of the Florida Legislature created the South Florida Conservancy District to reclaim land for settlement. The act also provided for a special assessment (acreage tax) on land within the district to finance improvements. An agricultural experiment station was created in 1921, and placed under the supervision of the Trustees of the Internal Improvement Fund. The station was declared to be subject to the assessments. The Trustees conveyed a section of their land to the State Board of Education while it was still used as part of the experiment station and refused to pay the assessments. The Legislature responded with an act making the Improvement Fund liable for all assessments on lands used by the experiment station. The district sought a writ of mandamus to compel payment. The Trustees attacked the validity of the act. The supreme court held that the writ should issue since the experiment station was benefitting from district projects. The court distinguished general taxes from special assessments, noting applicability of the latter under the circumstances regardless of a general tax exemption. (Harris-Fla)
W69-07075

UNITED STATES V WEAVER (REGULATING USE OF GOVERNMENT RESERVOIRS).

124 F Supp 517-525 (WD Ark 1954).

Descriptors: *Arkansas, *Federal government, *Reservoir operation, *Regulation, Reservoirs, Non-consumptive use, Recreation, Boats, Fishing,

Remedies, Judicial decisions, Legal aspects, Administrative agencies, Permits, Recreation facilities, Marinas, Boating, Land use, Water utilization, Use rates.
Identifiers: Department of the Army.

Defendant kept and maintained boats for rental use on a nearby government reservoir. Congress had authorized the Department of the Army to regulate the development and operation of recreational facilities on the reservoir. Plaintiff alleged that, in violation of Department of the Army regulations, defendant, through his sons and others, had been and was indirectly causing boats to be placed and operated on the reservoir for a fee or profit without authority from the Department of the Army. Plaintiff sought to enjoin such actions. The court held that defendant had no legal right to conducgmeeicial operation on the waters of the reservoir unless authorized to do so by the Department of the Army. It enjoined defendant from either directly or indirectly causing boats to be placed or operated on the reservoir for a fee or profit. However, the court noted that the Department of the Army had no control over the land on which defendant operated his business and, therefore, could not regulate such rentals. Nor did the Department have the right to determine that boats rented from defendant could not be used on the reservoir. (Gabrielson-Fla)
W69-07076

COUNTY SEWER SURVEY COMMISSIONERS.

N J Stat Ann secs 58:13-1 to 58:13-2 (1966), as amended, (Supp 1968).

Descriptors: *New Jersey, *Sewage disposal, *Water pollution, *Planning, Political aspects, Administrative agencies, Financing, Expenditures, Water pollution sources, Legislation, Construction, Construction costs, Water pollution control, Legal aspects, Cities, Maps, Maintenance, Sewage, Water pollution effects.

The commissioners are to consider the advisability of constructing a common sewerage system that will convey the discharge of municipal disposal plants to a common destination with the objective of preventing stream pollution. They are empowered to make maps and plans, estimate costs, and collect other information in relation thereto and are directed to present to the legislature and freeholders a comprehensive plan for the laying out, construction, and maintenance of such a sewerage system and disposal plant. (Holt-Fla)
W69-07077

ACQUISITION OF LANDS AND WATER RIGHTS FOR NEW OR ADDITIONAL WATER SUPPLY.
N J Stat Ann secs 58:6-1 to 58:6-5 (1966), as amended, (Supp 1968).

Descriptors: *New Jersey, *Water supply, *Cities, *Condemnation, Water rights, Legislation, Legal aspects, Water law, Eminent domain, Administrative decisions, Regulation, Water sources, Legal aspects, Administrative agencies.

The act provides that any corporation or person now or hereafter engaged in supplying municipalities with water has the power to acquire by gift, devise, or condemnation all lands and water rights necessary for any new or additional water supply provided such plans for diversion of water are approved and assented to by the state. Before the right of condemnation is granted, approval must be obtained from the State Water Policy Commission. All proceedings commenced under the power of condemnation are to be pursuant to eminent domain proceedings. This act by no way restricts the power to condemn lands, water, or water rights which were enjoyed by corporations and persons supplying municipalities with water under any previously existing law. (Holt-Fla)
W69-07078

GAITHER V ALBEMARLE HOSP (OBSTRUCTION TO NAVIGABLE STREAM AS A PUBLIC NUISANCE).
235 N C 431, 70 SE 2d 680-692 (1952).

Descriptors: *North Carolina, *Public rights, *Navigable waters, *Barriers, Breakwaters, Landfills, Relative rights, Rivers, Ownership of beds, Highways, Judicial decisions, Legal aspects, Real property, Streambeds, Land use, Land forming.
Identifiers: *Deep water line, *Injunctions (Prohibitory), *Public nuisance, Estoppel.

Plaintiffs and defendant purchased land from a common vendor. The land was bounded by a navigable river as shown on recorded maps and plats. Defendants sought to construct a breakwater along the deep water line and to fill up to the line in order to construct a public park. Plaintiffs contended that such action would deprive them of riparian rights, that defendant had no title to the beds of the river, and that defendant was estopped from altering the river by virtue of the recordation of the common vendor's maps and plats on which all buyers had relied in determining property boundaries. A referee made findings of fact and law consistent with plaintiffs' claim. The supreme court held it was settled that when an owner subdivides and records plats, he dedicates all public ways, as so platted, to the use of purchasers and the public. The river, as a navigable stream, constitutes such a public way. Any unreasonable, unauthorized obstruction of navigable waters is a public nuisance. It is sufficient to constitute such a nuisance if, as in this case, navigation is rendered less convenient. The fact that the obstruction may be of public benefit does not alter its character as a nuisance. An injunction was issued to prevent the construction of the breakwater and fill. (Harris-Fla)
W69-07079

UNITED STATES V PROPERTY ON PINTO ISLAND (TITLE TO RECLAIMED AND FILLED LANDS PREVIOUSLY SUBMERGED UNDER NAVIGABLE WATER).

74 F Supp 92-106 (S D Ala 1947).

Descriptors: *Landfills, *Ownership of beds, *Navigable waters, *Alabama, Land reclamation, Land tenure, Legal aspects, Riparian land, State governments, United States, Condemnation, Compensation, EMINENT DOMAIN, Public rights, Islands, Judicial decisions, Relative rights, Littoral, Federal government, Land forming, Boundaries (Property).
Identifiers: *Dredge spoil.

In a condemnation proceeding by the United States, three parties claimed title to land on Pinto Island, including a tract of reclaimed marshland and filled land which had been artificially created. The State of Alabama claimed title based on the fact that the lands had previously been the bed of a navigable water. The United States claimed title by virtue of a deed from the State of Alabama. One Turner claimed title based on the fact that the lands were an extension of a tract purchased by him. The fill was partially due to channel dredging and the deposit of spoil by the United States. The reclamation was accomplished by Turner. In determining who should be compensated for the condemnation of the land, the district court held that since the waters covering the submerged land were not navigable in fact, no title vested in Alabama. Therefore, no title passed from Alabama to the United States under the deed set up by the United States. The court held the privileges of a littoral owner included the right to fill out to navigable waters, regardless of who accomplished the filling. Such extension carries title with it, and thus Turner's claim of title prevailed. (Harris-Fla)
W69-07080

UNITED STATES V CAVALLIOTIS (OBSTRUCTING NAVIGATION).

105 F Supp 742-745 (E D N Y 1952).

Descriptors: *Federal jurisdiction, *Navigable waters, *Navigation, *New York, Ships, Judicial decisions, Legal aspects, Water law, United States, Nonnavigable waters, Legislation, Federal government, Streams.
Identifiers: *Obstruction to navigation, Penalties (Criminal).

Defendant was charged with violating a federal criminal statute which made it unlawful for anyone to obstruction navigation by means of a sunken vessel. Defendant's 22 foot wide ship sunk in the Steinway Creek while tied to a mooring and was permitted to remain in the 250 foot wide creek for over three years before an information was filed. The court held that the evidence adduced by the government failed to prove that the creek was navigable. The court said that the true test of navigability was susceptibility of use for transportation and not actual use. It was also found that defendant's ship was not sunk so as to impede navigation as a usable width of 228 feet still remained for vessels entering and leaving the creek. Since there was no obstruction to navigation, the defendant was found not guilty. (Holt-Fla)
W69-07081

PARKER V MOORE (LOSS OF NAVIGABILITY).

262 SW 2d 891-893 (Ark 1953).

Descriptors: *Arkansas, *Navigable waters, *Ownership of beds, *Nonnavigable waters, Transportation, Mineral industry, Oil, Natural gas, Leases, State governments, Judicial decisions, Rivers, Natural flow, Alteration of flow, Navigation, Navigable rivers, Lakes, Remedies, Highways, Streamflow, Beds under water.

Plaintiff brought this suit to have a lake adjacent to his property declared nonnavigable. Such a declaration would preclude the state's right to execute oil and gas leases for the land beneath the lake. The lake had once been part of a river and served as a means of transportation for many commercial ventures. However, over 100 years prior to commencement of this action, the natural course of the river changed drastically. This change isolated the present lake and rendered it nonnavigable. The court found that the lake was no longer a useful public mode of transportation. It no longer enjoyed its previous status as a navigable waterway. Since this was so, the judgement for the plaintiff was affirmed, and the defendant was found to have no right to grant mineral leases to the land beneath the lake. (Stewart-Fla)
W69-07082

DALRYMPLE V VILLAGE OF RANDOLPH (RETARDATION AND ALTERATION OF NATURAL FLOW).
275 App Div 743, 87 NYS 2d 742-743 (1949).

Descriptors: *New York, *Natural flow, *Alteration of flow, *Drainage water, Routing, Judicial decisions, Obstruction to flow, Natural flow doctrine, Streamflow, Surface runoff, Surface waters, Natural streams, Cities, Local governments, Gravels, Sediments, Retardants, Flow resistance, Remedies, Damages, Water levels, Drainage.
Identifiers: Injunctions (Mandatory).

Plaintiff brought this suit to recover for damage to his land allegedly caused by certain acts performed by defendant while trying to alter the natural course of a stream. These acts by the defendant caused large quantities of gravel to be deposited in the bed of a creek which drained the waters of the plaintiff's lands. The gravel retarded the natural flow. This caused a corresponding rise in the level of the water and prevented drainage. The court held the defendant liable for the damages. However, since the defendant restored both streams to their natural condition, the court refused to grant injunctive relief. (Stewart-Fla)
W69-07083

REGIONAL DEVELOPMENT AND THE RURAL POOR,
Kentucky Univ., Lexington.
For primary bibliographic entry see Field 06B.
W69-07155

ECONOMIC ASPECTS OF WATER RESOURCE POLICY,
Wisconsin Univ., Milwaukee.
For primary bibliographic entry see Field 06B.
W69-07159

THE TVA TRIBUTARY DEVELOPMENT PROGRAM,
Arkansas Coll., Batesville.
For primary bibliographic entry see Field 06B.
W69-07183

INTERNATIONAL TRADE AND ITS EFFECT ON UNITED STATES FISHERIES,
For primary bibliographic entry see Field 06B.
W69-07193

CITIZENS COMM FOR HUDSON VALLEY V VOLPE (WAIVER OF THE DEFENSE OF SOVEREIGN IMMUNITY).
For primary bibliographic entry see Field 04C.
W69-07195

CITIZENS COMM FOR THE HUDSON VALLEY V VOLPE (PRELIM INJUNCTION BARRING HIGHWAY CONSTRUCTION ALONG A NAVIGABLE STREAM).
For primary bibliographic entry see Field 04C.
W69-07196

STEVENS V STATE MINERAL BOARD (REMOVAL OF CLOUD FROM TITLE TO SUBMERGED LANDS).

221 So 2d 645 (La Ct App 1969).

Descriptors: *Louisiana, *Ownership of beds, *Beds under water, *Real property, Prescriptive rights, Legislation, Oysters, Bays, Streams, Lakes, Lagoons, Channels, Coasts, Lake beds, Oil industry, Administrative agencies, State governments, Boundaries (Property), Streambeds, Riparian rights, Legal aspects, Tidal waters, Inlets (Waterways).

Plaintiff brought suit to remove clouds from title of certain tidal water beds on the east coast of Louisiana. The defendant contended that the plaintiff's title to the beds was defective in light of the oyster statute which provided that all beds of rivers, lagoons, bayous, bays, and sounds connected with the Gulf of Mexico were to remain the exclusive property of the state. The court noted that the effect of the oyster statute was to unequivocally retake title to underwater beds transferred by the state to state agencies. The plaintiff's predecessors in title had derived title from the State Levee Board which had received a patent to the beds from the state. The court held that the Levee Board had been divested of title by the oyster statute before its transfer to any other predecessor and the plaintiff's derivative title was therefore a nullity. The court carefully distinguished situations where the rights of third parties had intervened before passage of the oyster statute; in such situations, there would be no divestiture of vested property rights. Summary judgment was entered for the defendant since title had reverted to the state. (Katz-Fla)
W69-07197

ZONING, PLANNING AND HOUSING REGULATIONS.
Conn Gen Stat Ann secs 8-2 (Supp 1968).

Descriptors: *Connecticut, *Zoning, *Land use, *Regulation, Cities, Local governments, Sewerage systems, Flood control, Public rights, Public health, Administrative agencies, Legislation, Land tenure, Water supply.

The zoning commission of each city, town or borough is authorized to make extensive zoning regulations to protect public health and property values. Regulations shall be made according to a comprehensive plan to secure safety from fire, flood and other calamaties, and insure provisions for water, sewerage and other public requirements. (Harris-Fla)
W69-07198

DRY COMMENTS ON WATER,
For primary bibliographic entry see Field 05G.
W69-07199

UNITED STATES V HUGHES (FLOWAGE EASEMENT).
For primary bibliographic entry see Field 04A.
W69-07200

FEDERAL-STATE RELATIONSHIPS IN THE ADOPTION OF WATER QUALITY STANDARDS UNDER THE FEDERAL POLLUTION CONTROL ACT,
For primary bibliographic entry see Field 05G.
W69-07201

LOCAL SHELL FISHERIES.
Conn Gen Stat Ann secs 26-238 to 26-294 (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Legislation, *Commercial shellfish, *Regulation, Fish management, Beds, Ownership of beds, Estuaries, Oysters, Clams, Mussels, Administrative agencies, Local governments, Permits, Tidal waters, Cultivation, Wildlife conservation, Fisheries, Bridges, Navigable waters, Streams, Boundaries (Property), Proprietary power, Legal aspects.

The selectmen of any town may appoint an oyster committee of not more than five electors of such town. The committee shall designate suitable places in the navigable waters within the jurisdiction of the town for planting or cultivating oysters, clams or mussels. Any individual desiring to cultivate oysters, clams, or mussels, may apply to the committee or to the authorized selectmen to designate a suitable place within the town's jurisdiction for that purpose. No such designation is effective until after a public hearing is held by the committee at which parties in interest and citizens may be heard. The applicant must provide the committee with a certificate from the town clerk stating that the ground has not previously been designated and is properly within the jurisdiction of the committee. Evidence of the committee's designation is to be recorded with the town clerk. The county court of common pleas may order lost and uncertain boundaries to be erected and established upon petition of an aggrieved party. This statute sets forth comprehensive prohibitions relating to the ways in which oysters may be taken. (Katz-Fla)
W69-07202

LOCAL SHELL FISHERIES.
Conn Gen Stat Ann secs 26-238 to 26-248 (1962), as amended, (Supp 1969).

Descriptors: *Connecticut, *Legislation, *Commercial shellfish, *Ownership of beds, Beds, Fish management, Estuaries, Oysters, Clams, Mussels, Administrative agencies, Local governments, Permits, Regulation, Tidal waters, Cultivation, Wildlife conservation, Fisheries, Bridges, Navigable waters, Streams, Boundaries (Property), Proprietary power, Legal aspects.

A designation by the committee shall consist of a written description of the ground by ranges or otherwise. All monies derived from such a designation shall be paid to the town. Any owner of ground previously designated and recorded by the town clerk may apply to have the ground redesignated to him should the evidence of that recording be lost. The court of common pleas for the appropriate county may appoint a committee of not more than three disinterested property owners to ascertain lost and uncertain boundaries. The court shall also entertain petitions from aggrieved parties seeking the return of natural beds to the public domain should such a bed be improperly granted. If such a bed has been improperly, but in good faith, staked-out, the court may grant the occupant a reasonable time to remove improvements and seeded oysters. (Katz-Fla)
W69-07203

LOCAL SHELL FISHERIES.
Conn Gen Stat Ann secs 26-249 to 26-251 (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Legislation, *Commercial shellfish, *Ownership of beds, Fish management, Beds, Estuaries, Oysters, Clams, Mussels, Administrative agencies, Local governments, Permits, Regulation, Tidal waters, Cultivation, Wildlife conservation, Fisheries, Bridges, Navigable waters, Streams, Boundaries (Property), Proprietary power, Legal aspects.

Each person who cultivates oysters, clams, or mussels in a lawfully designated place shall own the oysters so seeded as well as all oysters naturally found there. Such person shall have the exclusive right to take up and dispose of such oysters, clams, or mussels. However, the rights of any owner of lands in which there may be salt water creeks or inlets, or which may be contiguous to navigable waters, shall not be affected by the forgoing. The committee is prohibited from enclosing any natural oyster or clam bed and from infringing upon the free navigation of such waters. Shellfish grounds not within exclusive jurisdiction shall be taxed by towns in the same manner and to the same extent as real property and no other tax will be levied on such a franchise. (Katz-Fla)
W69-07204

LOCAL SHELL FISHERIES.
Conn Gen Stat Ann secs 26-251 to 26-258 (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Legislation, *Commercial shellfish, *Ownership of beds, Estuaries, Oysters, Clams, Mussels, Administrative agencies, Local governments, Permits, Regulation, Tidal waters, Cultivation, Wildlife conservation, Fisheries, Bridges, Navigable waters, Streams, Boundaries (Property), Proprietary power, Legal aspects.

Hard or round clams shall not be taken by a rake, tongs, or dredge unless such device has a space of more than one inch between its prongs. Clams less than one inch in thickness are not to be sold and are to be returned immediately to the water. Any person who trespasses upon designated ground shall be guilty of a misdemeanor. Any person who catches shellfish growing on or appurtenant to any bridge without written consent of the owner shall be fined. Plowing for shellfish is prohibited along Long Island Sound. Any person who injures the dams or gates of an oyster pond shall be fined. The superior county court, on application of the Oyster Committee, shall appoint three disinterested persons to ascertain, locate, and describe all the natural oyster, clam, or mussel beds within the boundaries of any town. These appointees will hold public meetings at which such determination shall be made. The findings made at such meetings shall be submitted to the court in the form of a report. (Katz-Fla)
W69-07205

LOCAL SHELL FISHERIES.
Conn Gen Stat Ann secs 26-259 to 26-294 (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Legislation, *Commercial shellfish, *Ownership of beds, Fish management, Beds, Estuaries, Oysters, Clams, Mussels, Administrative agencies, Local governments, Permits, Regulation, Tidal waters, Cultivation, Wildlife conservation, Fisheries, Bridges, Navigable waters, Streams, Proprietary power, Legal aspects, Boundaries (Property).

Each town shall maintain accurate maps of its designated areas as well as of its natural clam, mussel, and oyster bars. These maps shall be placed on file with the town clerk's office. The remainder of this statute covers peculiar residual rules pertinent to the taking of shellfish in certain areas of the state. (Katz-Fla)
W69-07206

COMMERCIAL FISHERIES.
Conn Gen Stat Ann secs 26-142 to 26-186 (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Legislation, *Fish, *Commercial fishing, Commercial fish, Commercial shellfish, Fisheries, Fish management, Administrative agencies, Fish conservation, Permits, Regulation, Wildlife conservation, Nets, Fyke nets, Gill nets, Trawling, Trapping, Legal aspects.

The use of nets or devices in the inland waters of Connecticut is prohibited without registration with the board. Any person operating or tending a registered net or device must obtain a permit from the board. The statute sets forth a comprehensive list of fees charged for registration of nets. The required fee is determined on the basis of the type of net involved and the variety of fish to be taken with the net. The inland waters within which lawful nets may be used is determined by the board. The specifications and dimensions of such nets and commercial fishing gear, as well as the fishing seasons, are determined by the board. Every state licensee impliedly consents to inspection of his license and catch. All commercial fish hatcheries must be licensed by the state and are subject to periodic inspection. Fish preserves may charge a fee for taking fish from waters within their control and persons so engaged need not have a sport fishing license. All commercial fishing vessels must be registered withe board, and all persons operating or assisting on such vessels must be licensed by the state. (Katz-Fla)
W69-07207

COMMERCIAL FISHERIES.
Conn Gen Stat Ann secs 26-142 to 26-147 (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Legislation, *Fish, Commercial fishing, Commercial fish, Commercial shellfish, Fisheries, Fish management, Administrative agencies, State governments, Fish conservation, Permits, Regulation, Wildlife conservation, Nets, Fyke nets, Gill nets, Trawling, Trapping, Legal aspects, Herrings, Eels.

All fyke, trap or pound nets are required to be buoyed and clearly marked with the license number of the owner in black numerals on a light background. All gill nets and seines shall have a metal registration tag attached. Tomcod and frost fish may be taken only by net constructed of twine or wire with mesh greater than three quarters of an inch and approved by the board. Smelt may be taken for commercial purposes only by registered nets, tended or operated by licensed persons. The board may extend the open season on smelt for as long as 7 days whenever adverse weather defers the smelt run. A permit is required to set an eel pot and any person using an eel pot must be licensed. No person shall take shad by using a net of less than 2 1/2 in. stretched mesh. The taking of shad is prohibited except during seasons determined by the board. During such seasons, shad may not be commercially taken on weekends. The taking of shad in any marine district is subject to the same regulations as in inland districts. (Katz-Fla)
W69-07208

COMMERCIAL FISHERIES.
Conn Gen Stat Ann secs 26-147 to 26-186 (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Legislation, *Fish, *Commercial fishing, Commercial fish, Commercial shellfish, Fisheries, Fish management, Administrative agencies, State governments, Fish conservation, Permits, Regulation, Wildlife conservation, Nets, Fyke nets, Gill nets, Trawling, Trapping, Crabs, Lobsters, Fertilizers.

The board may permit any person to use a net for taking shad in the Connecticut and Farmington Rivers. Commercial hatcheries must be licensed and every license must be renewed annually. All commercial fishing vessels must be registered and crewmen must be licensed. Drag nets over thirty feet in length must be registered and their operators licensed. The bowl of any weir or other device must be constructed of net with a stretch mesh of at least two inches but this does not apply to fyke nets used for catching herring or bony fish. The board may designate certain areas of water in or near stream mouths or estuaries within which use of certain nets will be prohibited. No person is permitted to render any food fish into oil or fertilizer. Size limitations on crabs, lobsters and sturgeon offered for commercial purposes are to be strictly enforced. Each holder of a commercial fishing license must make an annual report disclosing the number and value of boats, nets, and devices used by him and the number, weight and value of the species of fish or lobsters caught by him. (Katz-Fla)
W69-07209

FEDERAL AID FOR RESTORATION PROJECTS.
Conn Gen Stat Ann, secs 26-14 to 26-17 (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Legislation, *Administrative agencies, *Wildlife conservation, Fish conservation, Wetlands, Wildlife management, Permits, Habitat improvement, Federal government, United States, Fish establishment, Fish stocking, Legal aspects, Real property, Fisheries, Fish hatcheries, Regulation, Water resources development, Participating funds.
Identifiers: Federal-state relations.

Connecticut assents to Public Law 681 of the United States which offers aid to the states in fish restoration and management projects. The State Board of Fisheries and Game is directed to perform such acts as necessary to conduct and establish cooperative fish restoration projects, in accord with the guidelines set forth by the Secretary of the Interior. All funds accruing to the state from license fees paid by fishermen, hunters, and trappers shall be appropriated exclusively for the development of such fisheries The Board is authorized to acquire, by purchase, lease or otherwise, hunting and fishing rights on any land or water within the state. The Board shall determine the seasons during which these management lands shall be open and shall determine the bag limit permissible thereon. The Board may supply hunting facilities at a reasonable fee for use on these lands. The Board shall act in cooperation with the Department of Agriculture and Natural Resources in preserving and protecting the tidal wetlands of the state. (Katz-Fla)
W69-07210

FISHERIES AND GAME.

Conn Gen Stat Ann secs 26-6 to 26-7 (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Legislation, *Wildlife conservation, *Administrative agencies, Fish conservation, Regulation, Permits, Local governments, Cities, State governments, United States, Fisheries, Parks, Legal aspects, Wildlife management, Animals.
Identifiers: Penalties (Criminal), Arrest.

State conservation officers appointed by the Director of the State Board of Fisheries and Game may arrest any person for violation of state game or fish laws without a warrant. Such officers may search or examine without warrant any container in which he has cause to believe illegally taken game is concealed. State conservation officers shall enforce federal wildlife regulations. The chief executive authority for any town may, with consent of the police chief, appoint special constables for fish and game protection. These special constables shall enforce only state and municipal game laws. The State Board of Fisheries and Game may appoint suitable citizens in each community to assist, as volunteers, without compensation, in any game program of the Board. (Katz-Fla)
W69-07211

IN RE APPROPRIATION OF EASEMENTS FOR HIGHWAY PURPOSES (COMPENSATION FOR DAMAGES CAUSED BY TAKING UNDER EMINENT DOMAIN).
For primary bibliographic entry see Field 04C.
W69-07212

INTERSTATE COMM'N ON THE POTOMAC RIVER BASIN.
For primary bibliographic entry see Field 05G.
W69-07213

STATE BOARD OF FISHERIES AND GAME GENERAL PROVISIONS.

Conn Gen Stat Ann secs 26-2 to 26-3a (1960), as amended, (Supp 1969).

Descriptors: *Connecticut, *Fish management, *Game management, *Conservation, Legal aspects, Legislation, Dams, Easements, State jurisdiction, Local governments, Natural resources, Fish hatcheries, Fishing, Hunting, Water policy, Land use, Resource development, Training, Maintenance, Operation and maintenance, Trapping, Regulation.
Identifiers: Penalties (Criminal), Penalties (Civil).

An appointed board of five members, serving without compensation, enforces all state laws relating to wildlife, fish, crustacea, game and nongame birds, water-fowl and game and fur-bearing animals. It has all powers necessary to carry out its duties and may bring actions in court to enforce laws promulgated by the board. Areas of responsibility include: (1) introduction, securing, and distribution of fish and game suitable for the state; (2) designation of closed fishing areas; and (3) taking of any animal for scientific purposes. The board has jurisdiction over all fish and game belonging to the state and may regulate hunting, fishing, and trapping on state land. The board may acquire land for establishment of fish hatcheries or game preserves. It may grant easements to the United States Government or any state subdivision with the approval of the attorney general. The board may construct and maintain rearing ponds for fish and may distribute these fish in state waters. It may destroy any undesirable or diseased species. It may enter into cooperative agreements to promote wildlife research and training with federal or local governments and private groups. It may acquire easements needed for maintenance of state owned dams. (Johnson-Fla)
W69-07214

DRIVING ON ICE.

Conn Gen Stat Ann sec 14-163a (1958).

Descriptors: *Connecticut, *Ice, *Bodies of water, *Regulation, Public rights, Legal aspects, Legislation, Freezing, Iced lakes.
Identifiers: *Motor vehicle regulation, *Penalties (Criminal), *Evidence.

Driving a motor vehicle on the frozen surface of any public body of water shall be punishable by fine and, or, imprisonment. The presence of any motor vehicle on a frozen surface shall be prima facie evidence of a violation, except that this section shall not apply to governmental agencies or educational institutions. (Harris-Fla)
W69-07215

OBSTRUCTIONS.
For primary bibliographic entry see Field 04A.
W69-07216

RIGHT OF EMINENT DOMAIN.

W Va Code Ann sec 17-4-5 (1966), as amended, (Supp 1968).

Descriptors: *West Virginia, *Eminent domain, *Compensation, *Administrative agencies, State governments, Easements, Roads, Road construction, Bridges, Bridge construction, Interstate, Streams, Utilities, Decision making, Regulation.

The State Road Commissioner or the State Road Commission may acquire, by right of eminent domain, any land or water, or any interest therein, for purpose of constructing, widening, or otherwise altering any state road, or for purposes enumerated in section 17-4-25, or to provide a detour or temporary road or bridge while a road is in the process of construction, reconstruction, improvement, or repair, or for any other purposes authorized by any provision of this chapter. Whenever a just compensation cannot be agreed upon by the owner or claimant of such property, for such taking, use or damage, the State Road Commissioner, or the State Road Commission, are authorized to acquire, by eminent domain, any bridge or bridge site across any stream separating West Virginia from an adjoining state; such rights acquired may be acquired subject to use by any railroad or electric company. The State Road Commission may also exercise in any adjoining state such powers of eminent domain. Title to property condemned in any adjoining state may be taken either in the name of the state or of the State Road Commission. (Carruthers-Fla)
W69-07217

PERMITS AND POLLUTION CONTROL.
For primary bibliographic entry see Field 05G.
W69-07218

POWERS, DUTIES AND SERVICES OF DIRECTOR OF THE DEPARTMENT OF NATURAL RESOURCES.
W Va Code Ann secs 20-1-7, 20-1-18 (1966), as amended, (Supp 1968).

Descriptors: *West Virginia, *Wildlife conservation, *Natural resources, Conservation, Land resources, Water resources development, Forest management, Forest fires, Camping, Hunting, Recreation, Fish hatcheries, Fish conservation, Natural gas, Oil, Gravels, Sands, Parks, Condemnation, Legal aspects, Legislation, Administrative agencies, Project planning, Research and development, Inspection, Surveys, State governments.

The Director of the Department of Natural Resources is responsible for preparation and administration of a comprehensive program for the conservation of natural resources. The Director may execute agreements in the name of the state, conduct research in improved conservation, investigate the habits of wildlife, and fix or suspend hunting seasons. The Director also has the authority to designate necessary localities for the perpetuation of any species of wildlife. The Director may enter private lands in order to conduct surveys and inspections and may make arrests to enforce the provisions of this act. The Director may purchase and acquire land for state forests, parks, and recreation areas, for public hunting, trapping and fishing grounds, and for fish hatcheries, game farms, wildlife research areas and feeding stations. The Director is further empowered to sell oil, gas, timber, minerals, sand, and gravel on state lands and is responsible for the protection of forests from fire. The Director will represent the interests of the state under provisions of applicable federal acts. The Director shall study the land and water boundary areas of the state for development, conservation, and use of water, forests, minerals, and wildlife. (Kelly-Fla)
W69-07219

SLACK-WATER DAMS (NATURAL RESOURCES ACT).
For primary bibliographic entry see Field 04A.
W69-07220

UNITED STATES V VIRGINIA ELECTRIC AND POWER CO (COMPENSATION FOR GOVERNMENT CONDEMNATION OF A FLOWAGE EASEMENT).
For primary bibliographic entry see Field 04A.
W69-07221

CONNECTICUT RIVER FLOOD CONTROL COMMISSION.
For primary bibliographic entry see Field 04A.
W69-07222

MUNICIPAL FLOOD AND EROSION CONTROL BOARDS.
For primary bibliographic entry see Field 04A.
W69-07223

STATE V LANZA (DELEGATION OF THE EMINENT DOMAIN POWER OF THE STATE).
27 N J 516, 143 A 2d 571-581 (1958).

Descriptors: *New Jersey, *Eminent domain, *Condemnation, *Legislation, Water resources development, Water supply, State governments, Relative rights, Land tenure, Damages, Administrative agencies, Public rights, Judicial decisions.
Identifiers: *Delegation of legislative power, *Constitutionality.

Pursuant to an enabling act, the New Jersey Commissioner of Conservation and Economic Development was authorized to acquire land in the Round Valley area for use in the future establishment of a water supply system. Acquisition was authorized by purchase or exercise of eminent domain. The State of New Jersey attempted to acquire defendant's land for public use, but no purchase price could be agreed upon. Defendant claimed that the enabling act was an unconstitutional declaration of power. On appeal from a judgment appointing commissioners to assess damages sustained by the taking, the Supreme Court held the legislature could constitutionally appropriate money to reimburse municipalities for lost tax revenues and relocation of roads. The court further held it constitutional for the legislature to delegate the power of eminent domain since although the power is exclusively legislative, the legislature cannot directly supervise each exercise of it. By defining the general, appropriate and necessary public need, and delegating acquisition of the land, the legislature had not demonstrated improper motive or arbitrary and capricious abuse necessary for judicial review. The decision was affirmed. (Harris-Fla)
W69-07224

CRIMES AND PENALTIES RELATING TO WATERS AND WATERCOURSES.

W Va Code Ann secs 61-3-25, 61-3-26, 61-3-28, 61-3-36, 61-3-47 (1966), as amended, (Supp 1968).

Descriptors: *West Virginia, Boats, Ships, Navigation, Navigable waters, Legislation, Dams, Fish management, Obstruction to flow, Railroads, Canals, State governments, Legal aspects, Buoys, Warning systems.
Identifiers: Navigation aids, Penalties (Criminal).

It is a felony, punishable by one to five years imprisonment, to cast loose any vessel with intent to injure or defraud the owner or insurer thereof or to tamper with the mooring of a vessel or floating material with intent to injure by letting such vessel become adrift. It is a misdemeanor, punishable by fine not exceeding $500 and/or imprisonment not exceeding 6 months, to tamper with any buoy or other navigation aid. It is a felony, punishable by at least one year's imprisonment, to obstruct, remove, or injure any part of a railroad or canal. It is a misdemeanor, punishable by fine of not more than $50 or imprisonment not more than 30 days, to anchor a shanty boat upon the real estate of another for more than twelve hours. Section 61-3-47 provides regulations for constructing dams in navigable streams and prohibits obstructing such streams by felling timber; violation is a misdemeanor punishable by fine not to exceed $1000 and/or imprisonment not to exceed one year. (Kahle-Fla)
W69-07225

STEPHENS V STEWART (VICARIOUS LIABILITY FOR NEGLIGENT MOTORBOAT OPERATION).

165 SE 2d 572-577 (Ga Ct App 1968).

Descriptors: *Georgia, *Boating, *Hazards, *Navigable waters, Legal aspects, Admiralty, Legislation, Administrative agencies, Federal government, State governments, Regulation, Judicial decisions, Recreation, Water sports, Swimming, Safety.
Identifiers: *Family purpose doctrine, *Vicarious liability, *Motorboat numbering act, *Civil liability, Retroactive legislation, Wrongful death action.

Plaintiff brought suit for wrongful death against the father of a 13 year old girl who struck and killed a 16 year old boy while operating a motorboat. The trial court entered judgment for plaintiff under the theory of respondiat superior. The court of appeals, in reversing the lower court, held that the act extending the 'family purpose' doctrine to watercraft was not retroactive, since it altered substantive rights, and did not apply to the case at hand. The court further held the power delegated to the Game and Fish Commission under the motorboat numbering act did not extend to a creation of civil liability for motorboat owners, even where the Legislature had approved the Commission's regulations. The court refused to consider a complaint based upon admiralty law and federal statutes dealing with watercraft operation on navigable waters, since the lake in question (Lake Lanier) had been held not to be navigable waters of the United States in a federal district court action. (Harris-Fla)
W69-07226

STATE V GILL (TITLE TO ARTIFICIAL ACCRETION).

66 So 2d 141-146 (Ala 1953).

Descriptors: *Alabama, *Riparian rights, *Landfills, *Accretion (Legal aspects), Littoral, Federal government, State governments, Riparian land, Remedies, Bays, Reclamation, Channels, Dredging, Channel improvement, Boundaries (Property), Shores, Navigation, Navigable waters, Ownership of beds, Judicial decisions, Legal aspects.

The federal government, while engaged in constructing a navigable channel, deposited some of the material dredged out of the channel along the shoreline of respondent's property, creating an artificial, manmade accretion. The state filed a bill to quiet title to the accreted land. Respondent answered, alleging that he possessed the title to the property and praying for general relief. The circuit

court held that title to the land was vested in respondent, and complainant appealed. The court, while making some procedural modifications, affirmed the decision of the lower court. After examining the relevant authorities, the court found that the governing rule of law was that where accretion to the shore was caused by legitimate actions of the federal government, such accretion belonged to the littoral owner rather than the state. While the state has title to the beds of navigable waters, this is title to the beds as beds, not to the individual grains of sand or lumps of mud that constitute the land making up the beds. Consequently, the state has no title when the bottom is pumped up to create new land. The manmade land being added to the property of the riparian or littoral owner becomes the property of such owner. (Gabrielson-Fla)
W69-07227

DEPARTMENT OF HEALTH.
For primary bibliographic entry see Field 05G.
W69-07228

BRYANT V CHICAGO MILL AND LUMBER CO (TITLE TO ACCRETED LANDS).
216 F 2d 727-734 (8th Cir 1954).

Descriptors: *Arkansas, *Accretion (Legal aspects), *Boundaries (Property), *Land tenure, Judicial decisions, Water law, Federal jurisdiction, Riparian land, Chutes, Streams, Severance, Taxes, Remedies, Legal aspects, Real property.
Identifiers: Quiet title suit, Adverse possession.

Plaintiff brought this suit to quiet title to accreted lands held under a tax deed. Defendant cross-claimed to quiet title to the land in himself. The trial court granted judgment for defendant, and plaintiff appealed. Both parties trace their title to a common owner. The accretions in question were located on the east side of a stream. By a tax deed, plaintiff acquired title to land along the west side of the stream. Defendant claimed title to accreted lands along the stream under deeds purporting to convey all land east of the stream. Defendant had also paid taxes on the accreted lands for 15 years. Plaintiff based his claim on the general rule that a conveyance of riparian land carries with it all accretions accumulated thereon. Defendant claimed that there was a severance of plaintiff's original riparian lands from the accreted lands in question. The court affirmed a judgment for the defendant, basing their decision on the fact that defendant's title purported to convey all land east of the stream. In addition, defendant had paid taxes for 15 years on the accreted lands, thus severing plaintiff's riparian land from the accretions. The court noted that plaintiff was entitled only to the accretions on the west side of the stream. (Holt-Fla)
W69-07229

CARROLL V HOPPE (RIGHT OF A RIPARIAN OWNER TO CONSTRUCT A JETTY).
For primary bibliographic entry see Field 04A.
W69-07230

LEONARD V STATE HIGHWAY DEPT (REVESTING TITLE TO SUBMERGED LAND IN THE STATE).

24 N J Super 376, 94 A 2d 530-535 (1953).

Descriptors: *New Jersey, *State governments, *Ownership of beds, *Land reclamation, Legal aspects, Land tenure, Navigable waters, Dikes, Tidal waters, Low water mark, High water mark, Tidal effects, Beds, Administrative agencies, Riparian rights, Riparian land, Shores, Public rights, Legislation, Judicial decisions, Boundaries (Property), Land development.
Identifiers: *Riparian grants, *State ownership.

Plaintiff's predecessor in title had constructed a dike along the bank of a stream in order to exclude tide waters from a portion of plaintiff's land. Plaintiff acquired title to the reclaimed lands through the previous title holder. Upon application by the State Highway Department, a riparian grant was issued to the state without notice to the plaintiff. Plaintiff sought to set aside the grant and to have a judgment of title in his favor. The superior court held that mere reclamation or improvement of land between the low and high water marks vested title in the shore owner under the state's 'Wharf Act.' The court further held that the repeal of the Act did not affect plaintiff's title. However, the court held that erosion along tidal waters extended the state's domain by natural means and revested title in the state. The dike no longer preserved plaintiff's title, and the grant to the State Highway Department was valid. The court felt that the state could retain its own title to land under water without notice to riparian owners. However, in dicta, the court said a grant to an individual must be subject to the preemptive rights of the riparian proprietor to have notice. A judgment was entered for the defendant. (Harris-Fla)
W69-07231

BRINDLEY V BOROUGH OF LAVALLETTE (VALIDITY OF CITY ORDINANCE REGULATING BEACH).

33 N J Super 344, 110 A 2d 157-168 (1954).

Descriptors: *New Jersey, *Legislation, *Boundaries (Property), Riparian land, Atlantic Ocean, Cities, Recreation, Easements, Public rights, Swimming, Beaches, Fishing, Legal aspects, Relative rights, Tidal waters, Surveys, High water mark, Low water mark, Judicial decisions.
Identifiers: *Pre-emptive rights, *Adverse user, Dedication, Due process (Substantive).

Beach front owners sued to test the validity of a city ordinance establishing a paid bathing beach which prohibited use by non-residents. Plaintiffs asserted that the city was not owner of the ocean front. Plaintiffs asserted that their properties abutted a street contiguous with the ocean front, and their titles extended to the high water mark, entitling them to riparian rights. Therefore, plaintiffs contended that the ordinance in question deprived them of their property rights. The court held the ordinance invalid as discriminatory against non-residents. The court observed that plaintiffs' deeds referred to a recorded map which described plaintiffs' lots together with intersecting streets, and, since this was so, the selling of the lots by plaintiffs' grantor amounted to a dedication of these streets. The court declared that plaintiffs owned to the center line of the street because the dedication was not formally accepted by the city nor impliedly accepted by public use. However, the street was subject to dedication when the city desired to accept it. The court stated that, since the mean high water mark never reached the street's center line, plaintiffs were not littoral owners with a pre-emptive right to a riparian grant. The court held the ordinance valid, except for the discriminatory provisions, since a state statute authorized the city to regulate beaches acquired for recreational purposes. (Reed-Fla)
W69-07232

KENNEBEC TOWING CO V STATE (COLLISION WITH UNDERWATER OBSTRUCTION).
For primary bibliographic entry see Field 04A.
W69-07233

ANDERSON V DE VRIES (RIGHT OF WAY AND ACCESS OVER LAND TO A BEACH).

93 NE 2d 251-256 (Mass 1950).

Descriptors: *Massachusetts, *Right-of-way, *Beaches, *Access routes, Legal aspects, Land tenure, High water mark, Real property, Easements, Sea walls, Judicial decisions, Low water mark, Boundaries (Property), Roads, Swimming, Recreation facilities.
Identifiers: *Custom and usage.

Plaintiffs seek a determination of a right of way and a designation as to beach area available for their use as lot owners in the vicinity of the beach. Defendants owned land separating plaintiffs' lots from the beach and over which the alleged right of way extended. Plaintiffs' deeds provided, by means of a uniform clause, for a right of way to the beach, and prior to a conveyance to the defendants, it had been the custom of plaintiffs to use a 12 foot wide road to approach and make full use of the beach for sunbathing and swimming. Reviewing a decree by the Land Court, to which defendants filed exceptions, the Supreme Judicial Court held that defendants took no better title than their grantors, who had acquiesced in the use of the road and beach, and that although the right of way specified in the deed was indefinite, the one customarily used had implicitly replaced it. The Court held a 'beach' to be the land above the high water mark and defined by some natural or artificial sea wall or boundary which provides convenient and safe access to the water. Although not explicit in the deed, the court ruled the right of way included use of the entire beach--not merely an area equal to the width of the way. (Harris-Fla)
W69-07234

DAVIS V MORGAN (OWNERSHIP OF SUBMERGED LAND AND ACCRETION).

228 N C 78, 44 SE 2d 593-597 (1947).

Descriptors: *North Carolina, *Accretion (Legal aspects), *Land tenure, *Dredging, Legal aspects, Navigable waters, State governments, Legislation, Beds, Islands, Judicial decisions, Boundaries (Property), Real property.
Identifiers: *Jury instructions.

Plaintiffs brought action to establish title to certain property and to restrain defendant from trespassing thereon. Plaintiffs claimed title to land under an 1853 grant conveying land which was, at that time, either an island, a marsh or a shoal--partially submerged. Defendant contended that plaintiffs' grant was void as an attempt to convey land covered by navigable waters in violation of state law (G S 146-1). Defendant further claimed title to the land under a grant from the state in 1937. The superior court held for the plaintiffs. On appeal, the Supreme Court held that the following charge was not erroneous: 'Accretion is the increase of real estate by the gradual deposit by water of solid material...so as to cause that to become dry land which was before covered by water,...The doctrine of accretion does not apply to land reclaimed by man by filling in land once under water and making it dry.' The issue was whether accretion or dredging had caused additions to the tract in question. The court reversed the lower court on the basis of an erroneous exclusion of certain evidence and ordered a new trial. (Harris-Fla)
W69-07235

LOVIN V TOWN OF HAMLET (ATTRACTIVE NUISANCE DOCTRINE APPLIED TO ARTIFICIAL LAKE).
For primary bibliographic entry see Field 04A.
W69-07236

JONES V TURLINGTON (RIGHTS OF RIPARIAN OWNER TO ACCRETION).

243 NC 681, 92 SE 2d 75-77 (1956).

Descriptors: *North Carolina, *Riparian rights, *Maps, *Accretion (Legal aspects), Damages, High water mark, Inland waterways, Channels, Riparian land, Islands, Marshes, Navigable waters, Navigation, Wharves, Piers, Erosion, Legal aspects, Judicial decisions, Boundaries (Property), Beds.
Identifiers: *Deeds, Property description, Injunctions (Mandatory).

Plaintiff brought suit for recovery of lands and damages for trespass to certain riparian lands which he claimed he was the owner. Defendant denied plaintiff's title to the land. Plaintiff had conveyed certain lands to the defendant. The lands as defined on the map included the riparian land. The plaintiff contended that he did not convey the riparian land since that land had been gradually built up through accretion. The court held that conveyance by the plaintiff, without reservation, vested ownership of land bordering on the waterway in the defendant with riparian rights incident to the ownership. The court held that the owner of riparian land acquires title to all extensions of his land by accretion and loses title to those lands that are washed or eroded away. The court held that the plaintiff had failed to show that title vested in him and granted judgment for defendant. (Shevin-Fla)
W69-07237

PASSAIC VALLEY SEWERAGE DISTRICT.
For primary bibliographic entry see Field 05G.
W69-07238

CITY OF TACOMA V TAXPAYERS OF TACOMA (STATE COURTS PRECLUDED FROM CONSIDERING ISSUES DECIDED BY FEDERAL COURTS).

357 U S 320-342 (1958).

Descriptors: *Federal government, *Federal Power Act, *Federal jurisdiction, *Federal-state water rights conflicts, Legal aspects, Water rights, Hydroelectric project licensing, Cities, State jurisdiction, State governments, Navigable rivers, Pondage, Water resources, Hydroelectric plants, Dams, Stream fisheries, Electric powerplants.
Identifiers: United States Supreme Court, Delegation doctrine, Due process, Commerce power.

Plaintiff city was granted a license by the Federal Power Commission, over objections of the State Attorney General, to construct a series of power dams over navigable rivers. Some of these dams were to be built on state-owned lands, and one would cause inundation of a state fish hatchery. The state appealed the Commission's order to the Federal Circuit Court of Appeals which upheld the order. The city brought suit, under the license, to obtain a state superior court order allowing the city to issue revenue bonds to finance the project. The state intervened asserting the same grounds that had been rejected by the Power Commission and the federal court. The state superior court ruled in favor of the state, and the state supreme court affirmed. The city obtained certiorari to the U S Supreme Court which reversed the decision of the state courts. The state's contention that the city could not exercise federal eminent domain power to take state property was rejected. The city's license and right to take the state lands in question were a valid delegation of the Federal Power Commission's exclusive dominion over the navigable waters of the United States. The state's ability to appeal Power Commission orders unfavorable to it has been prescribed by federal statute. The federal court of appeals' decision favoring the Commission was final under federal law, and the state could not, in a later state court action, question the city's power to take state lands under its federal license. (Blunt-Fla)
W69-07239

UNITED STATES V FEDERAL POWER COMMISSION (FEDERAL POWER COMMISSION AUTHORITY OVER PROJECT LICENSING).
For primary bibliographic entry see Field 04A.
W69-07240

DYE V UNITED STATES (WRONGFUL DEATH ACTION FOR NEGLIGENCE IN DAM MAINTENANCE).

210 F 2d 123-129 (6th Cir 1954).

Descriptors: *United States, *Warning systems, *Accidents, *Dams, Boating, Kentucky, Administrative agencies, Federal government, Judicial decisions, Legal aspects, Ohio River, Control structures, Dam design, Engineering structures, Damages, Navigable rivers, Navigable waters, Operation and maintenance, Flow augmentation, Regulation.
Identifiers: *Negligence, Corps of Engineers, Coast Guard, Wickets.

Plaintiffs brought these wrongful death actions against the defendant as a result of drownings which occurred when two small boats were pulled over a dam by the force created when the dam's wickets were left open. Plaintiffs alleged negligence on the part of the Coast Guard and the Corps of Engineers in permitting the wickets of the Ohio River Dam to be open without adequate warning and without suitable protection for river travelers. The dam was owned by the United States, and the Corps of Engineers was responsible for its maintenance and operation. Upon hearing evidence which included testimony that two signs warning of the dangerous condition were prominently displayed, the trial court dismissed the complaints. The appellate court reversed, directed verdicts for plaintiffs, and remanded for a determination of damages. The court held that the evidence was sufficient to establish negligence by the dam operator in failing to give adequate warning of a dangerous condition and failure of the Government to use protective measures for the benefit of navigators. The court noted that the area Coast Guard observer failed to warn boats after being instructed as to when the wickets would be lowered. (Wheeler-Fla)
W69-07241

UNITED STATES V GENERAL BOX CO (CONDEMNATION OF LAND FOR LEVEE PURPOSES).
For primary bibliographic entry see Field 04A.
W69-07242

GENERAL BOX CO V UNITED STATES (RECOVERABLE DAMAGES FROM LEVEE CONSTRUCTION).
For primary bibliographic entry see Field 04A.
W69-07243

CENTRAL NEW YORK BROADCASTING CORP V STATE (SUIT TO RECOVER DAMAGES FOR NEGLIGENCE OF STATE IN FLOOD CONTROL PROJECT).
For primary bibliographic entry see Field 04A.
W69-07244

PERKINS V PALO ALTO COUNTY (SUIT FOR INJUNCTION REQUIRING COUNTY TO CONSTRUCT A CULVERT).
For primary bibliographic entry see Field 04A.
W69-07245

UNITED STATES V DICKINSON (SUIT TO RECOVER VALUE OF LAND FLOODED BY THE FEDERAL GOVERNMENT).
For primary bibliographic entry see Field 04A.
W69-07246

TOOMER V WITSELL (CONSTITUTIONALITY OF STATE REGULATION OF SHRIMPING IN 3 MILE MARITIME BELT).

334 U S 385-410 (1948).

Descriptors: *Commercial fishing, *Regulation, *Shrimp, *State governments, Legal aspects, South Carolina, Legislation, Permits, Taxes, Relative rights, Fish migration, State jurisdiction, Judicial decisions, Fish management, Fish conservation, Fish harvest.
Identifiers: *Maritime belt, *Constitutionality, *Injunctions (Prohibitory), Privileges and immunities clause, Police power, Commerce clause.

Fishermen (residents of Georgia) sought to enjoin enforcement of South Carolina statutes governing commerical shrimping for migratory shrimp within the 3 mile maritime belt off the coast of South Carolina. The district court refused to issue the injunction. The Supreme Court held that the state had sufficient interest in preserving the natural resources of the state to sustain the regulation of shrimping in the maritime belt as a reasonable exercise of the state's police power. The court upheld a tax on shrimping but found two exercises of the power unconstitutional. An imposition of license fees 100 times greater for non-residents than for residents was violative of the privileges and immunities clause since the state could not justify the discrimination as necessary for conservation of shrimp. The Court denied the state 'owned' the shrimp, since they were migratory. A statute requiring unloading, packing, and tax stamping of all shrimp caught in the maritime belt to be done in South Carolina ports was held violative of the commerce clause. The Court held that the state could prohibit shrimping completely; however, if it chose not to do so, it could not excessively burden interstate commerce by imposing rigid economic patterns after such shrimping occurred. (Harris-Fla)
W69-07247

GOODYEAR TIRE AND RUBBER CO OF ALABAMA, INC V GADSDEN SAND AND GRAVEL CO, INC (UNDERSEEPAGE AND WATER FLOWAGE).
For primary bibliographic entry see Field 04A.
W69-07248

BURLEYSON V WESTERN AND ATLANTIC RR (OVERFLOW AS AN ABATABLE NUISANCE).
For primary bibliographic entry see Field 04A.
W69-07249

PERSIN V CITY OF YOUNGSTOWN (FLOODING OF LOWER TRACT DUE TO AIRPORT CONSTRUCTION).
For primary bibliographic entry see Field 04C.
W69-07250

GOUGH V GOBLE (OBSTRUCTION TO FLOW OF SURFACE WATER).
For primary bibliographic entry see Field 04A.
W69-07251

STATE V GEORGE C STAFFORD AND SONS (BOUNDARY DISPUTE OVER FILLED IN LAKE SHORE).
For primary bibliographic entry see Field 04A.
W69-07252

TEXAS CO V MONTGOMERY (POLLUTION CONTROL BY STATE AGENCIES).
For primary bibliographic entry see Field 05G.
W69-07253

FLANAGAN V GREGORY AND POOLE INC (UPSTREAM RIGHTS IN RE FLOW).
For primary bibliographic entry see Field 04C.
W69-07254

COUSIN V HORNSBY (LANDOWNER IS RESTRICTED TO ACTION FOR DAMAGES ONCE RIGHT TO RESIST EXPROPRIATION IS WAIVED).
For primary bibliographic entry see Field 04C.
W69-07255

BUILD PIER AS MEMORIAL TO SAILORS AND SOLDIERS.

N J Stat Ann secs 40:179-106 through 40:179-108 (1967), as amended, (Supp 1968).

Descriptors: *New Jersey, *Piers, *Recreation facilities, *Parks, Social aspects, Seashores, Ownership of beds, Oceans, Coasts, Littoral, Atlantic Ocean, Piles (Foundations), State jurisdiction, Public benefits, Legislation, Public lands, Tidal waters, Financing.
Identifiers: Notice, Due process.

This statute, passed in 1924, allows any oceanside city to make permanent use of the state's tidewater lands for the purpose of constructing a 'victory pier' in memory of the nation's soldiers and sailors. The pier must be a part of an area set aside for a public resort or as a public park. Such pier may be paid for under any reasonable method the common council of the city, with the assent of the public, may choose. The piers may not extend more than 3,000 feet outward from the oceanside boundary line of the public area, and such piers shall be considered part of the public area. The statute establishes notice requirements which must be followed in the event the common council of any city intends to pass an ordinance authorizing a 'victory pier.' All parties interested in such an ordinance must be given an opportunity to be heard. (Blunt-Fla)
W69-07256

FISH AND GAME LAWS--FISHWAYS IN DAMS.

N J Stat Ann secs 23:9-94 to 23:9-97 (1940).

Descriptors: *Dams, *Fish passages, *Fish management, *Construction costs, Administrative agencies, State governments, New Jersey, Legislation, Rivers, Regulation, Financing.
Identifiers: Raritan river.

The Fish and Game Board is hereby empowered to examine all dams spanning the Raritan River and its tributaries to ascertain whether such dams have good and efficient fishways constructed in them. The Board has the power to order the party in possession of a dam to build, rebuild, or remodel inefficient fishways. The Board must give each individual sixty days from receipt of notice to complete the required work. If the work ordered is not done, the Board may cause it to be done at the expense of the individual and may bring action in a court of law to recover the costs incurred in performing the work. (Blunt-Fla)
W69-07257

RIVER DEVELOPMENT CORP V LIBERTY CORP (LAPSE OF OPTION TO IMPROVE OFFSHORE LANDS THROUGH INACTION ON THE PART OF THE GRANTEE).

45 N J Super 445, 133 A 2d 373-379 (1957).

Descriptors: *New Jersey, *Grants, *State governments, *Ownership of beds, Judicial decisions, Permits, Legislation, Legal aspects, Water law, Beds, Beds under water, Dredging, Excavation.
Identifiers: Options.

Plaintiff sought a judicial declaration of his rights in certain offshore tidal lands. The plaintiff calimed title under an 1869 statute, the United Companies Act, which authorized the plaintiff's predecessor in title to fill the lands in question. The plaintiff bought the lands from its predecessor in 1955. Neither the plaintiff nor its predecessors ever made any attempt to improve the lands as stipulated. The defendant denied that the 1869 act conveyed anything more than a revocable license which the state impliedly revoked by granting the defendant's license to dredge in the area. This court held that guardianship of tide-flowed lands below the high water line is in the legislature and therefore is subject, by statute, to an express grant of a freehold, or any lessor, estate, to any grantee, regardless of whether he is the owner of the lands above the high water mark or not. The 1869 act created a revocable license in the plaintiff's predecessor, a mere personal privilege which was revocable at law, at the licensor's pleasure, even though substantial sums had been paid in consideration of the license. When no time is fixed for performance under a contract or option, a reasonable period is intended, and where there has been no performance for 88 years, such option becomes unenforceable and the holder may lose his inchoate right to the land. (Blunt-Fla)
W69-07258

NORTH COUNTIES HYDRO-ELECTRIC CO V UNITED STATES (HYDRO-ELECTRIC PLANTS).

151 F Supp 322-324 (Ct Cl 1957).

Descriptors: *Illinois, *Hydroelectric plants, *Flood damage, *Ice jams, Flood protection, Flood forecasting, Flood control, Ice, Ice breakup, Dams, Dam design, Power plants, Legal aspects, Reservoirs, Reservoir storage, Rivers, Judicial decisions.

Plaintiff owned and operated a hydro-electric power plant on the Fox River in Illinois. He brought suit against the United States for an alleged taking of his plant. Plaintiff had brought an identical suit against the United States 10 years earlier. In both cases, plaintiff's theory was that the United States, by erecting a dam on the Illinois River, created a condition which caused large ice jams to form below plaintiff's dam. This condition so impeded the flow of the Fox River as to cause flooding of plaintiff's power house, thereby halting its operation. The United States interposed the defense of res adjudicata. The court sustained this defense, holding that every element of plaintiff's cause of action had been finally adjudicated in the earlier proceedings between the parties. (Carruthers-Fla)
W69-07259

STUART V LAKE WASHINGTON REALTY CORP (ACTION TO ENJOIN FLOODING OF PROPERTY BY RAISING LAKE LEVEL).
For primary bibliographic entry see Field 04A.
W69-07260

FEIG V GRAVES (PLAINTIFF CLAIMS IMPLIED EASEMENT TO SHORE OF RECEDING LAKE).
100 So 2d 192-196 (2d DCA Fla 1958).

Descriptors: *Florida, *Easements, *Riparian rights, *Accretion (Legal aspects), Judicial decisions, Water law, Boundary disputes, Relative rights, Boundaries (Property), Lakes, Ownership of beds, Scenic easements, Easements, Legal aspects.
Identifiers: Implied easements, Injunctions (Prohibitory).

Plaintiffs requested a declaratory judgment regarding their rights in respect to land and waters adjacent to a lake owned by defendants. A plat map of the area in question showed that plaintiffs' rest home originally was separated from the lake only by a walkway circling the lake. The lake had receded in recent years, however, leaving the edge of the path between 70 and 80 feet from the lake. Plaintiffs asserted that they retained an implied easement for use of the land adjoining the lake, although the walkway was some distance from the water. The court found that the original subdividor of the property had intended that plaintiffs retain use of the land adjoining the lake, and that this easement extended to the present lake margin. In Florida the margin of a body of water constituting a boundary generally continues to be the boundary regardless of reliction or erosion. Since the defendants owned the lake bed, plaintiffs gained no rights in fee to the land between the old and new lake margins; plaintiffs' easement, however, extended to the new location of the lake margin. (E Kelly-Fla)
W69-07261

ORTEGO V CALDWELL (ACTION FOR DAMAGES DUE TO CROP FLOODING RESULTING FROM DEFECTIVE LEVEE).
For primary bibliographic entry see Field 04C.
W69-07262

GINTHER V LONG (ACTION FOR DAMAGES DUE TO TEMPORARY POLLUTION OF SOIL, RESULTING IN TIMBER LOSS).
For primary bibliographic entry see Field 04C.
W69-07263

6F. Nonstructural Alternatives

FLOOD COVERAGE: NEW CHALLENGE FOR INSURANCE.
For primary bibliographic entry see Field 04A.
W69-06898

INDUSTRIAL FLOOD LOSSES: DAMAGE ESTIMATION IN THE LEHIGH VALLEY,
Chicago Univ., Ill.
For primary bibliographic entry see Field 06B.
W69-07174

07. RESOURCES DATA

7B. Data Acquisition

SIPHON METHOD FOR MEASURING WATER LEVELS,
Geological Survey, Phoenix, Ariz. Water Resources Div.; and Agricultural Research Service, Chickasha, Okla. Soil and Water Conservation Research Div.
Coyd Yost, Jr. and James Nancy.
J Amer Water Works Ass, Vol 61, No 6, pp 314-316, June 1969. 3 p, 1 fig, 3 ref.

Descriptors: *Gaging stations, *Reservoirs, *Siphons, Pipelines, Tubes, Water measurement, Instrumentation, Reservoir stages, Water levels.
Identifiers: Reservoir gages.

The use of siphons for measuring reservoir water levels is discussed. If a gage in the reservoir or a tube to lead water through the dam to a remote gate is impractical, a siphon may be used to lead water over the dam, if the altitude difference between the water surface and siphon summit is not too great. Experience in designing and using the siphon method indicates that it is practical and generally applicable for measuring water levels in lakes, canals, streams, wells, and other open water bodies. Under certain field conditions the method is distinctly preferable to other methods. The characteristics that particularly contribute to the usefulness of the siphon method concern its accuracy and the fact that its installation, maintenance, and operation are simple and economical. For special applications the siphon may be designed as a light-weight portable unit and installed with hand tools. Absence of any horizontal inlet precludes difficulties in installation or structural damage to the canal, dam, or stream bank. The well and recorder may be remotely located at a convenient site relatively far from the water body. (USGS)
W69-07086

DESIGN AND PERFORMANCE OF AN OSMOTIC TENSIOMETER FOR MEASURING CAPILLARY POTENTIAL,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
A. J. Peck, and R. M. Rabbidge.
Soil Sci Soc Amer Proc, Vol 33, No 2, pp 196-202, Mar-Apr 1969. 7 p, 11 fig, 9 ref.

Descriptors: *Tensiometers, *Osmotic pressure, *Soil water, Soil moisture, Soil chemistry, Osmosis, Capillary action, Capillary water, Pore pressure, Moisture tension.

Identifiers: *Osmotic tensiometer, Capillary potential.

An osmotic tensiometer makes use of a confined aqueous solution, instead of pure free water, as the reference state in measuring soil-water potentials. The membrane separating the confined solution from soil water is highly impermeable to the confined solute (polyethylene glycol, molecular weight 20,000), but exchange of much smaller molecules and ions occurs. Thus the capillary potential of soil-water is measured unless soil solutes are excluded from the instrument by a vapour gap. The advantage of this instrument over conventional tensiometers is that measurements of capillary potential can be made throughout the range 0 to minus 15 bar. Tests and observations show that osmotic tensiometers can be useful for measurements of capillary potential at depths greater than about 10 cm during the redistribution of soil water, and its uptake by plants. For accurate data, zero checks should be made when possible, and instrument temperature should be recorded to enable correction for its effect on each reading.
W69-07090

AERIAL PHOTOGRAPHIC TECHNIQUES IN POLLUTION DETECTION,
Wisconsin Univ., Madison. Dept. of Civil Engineering; and Itek Corp., Lexington, Mass. Photogrammetry Dept.
For primary bibliographic entry see Field 05A.
W69-07111

DYNAMIC MEASUREMENT OF THE HYDROLOGIC CHARACTERISTICS OF UNSATURATED POROUS MATERIALS,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 02G.
W69-07152

7C. Evaluation, Processing and Publication

CHARACTERIZATION OF BRINES FOR ECONOMIC ANALYSIS,
Dow Chemical Co., Freeport, Tex.
For primary bibliographic entry see Field 03A.
W69-06951

SUBSURFACE BRINES AND MINERAL EQUILIBRIA,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 02K.
W69-06952

A SPECIAL CASE, THERMAL DIGITAL SIMULATION OF WASTE HEAT DISCHARGES,
Battelle Memorial Inst., Richland, Wash.; and Computer Sciences Corp., Richland, Wash.
For primary bibliographic entry see Field 05C.
W69-06979

COMPUTER-PRODUCED TABLES, MAPS, AND DIAGRAMS AS TOOLS IN THE INTERPRETATION OF BRINE DATA FROM SOUTHEASTERN KANSAS,
Geological Survey, Washington, D. C.
For primary bibliographic entry see Field 05G.
W69-07102

SALINE WATER IN SOUTHEASTERN NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.; and Air Force Weapons Lab., Kirtland AFB, N. Mex.
For primary bibliographic entry see Field 02K.
W69-07104

08. ENGINEERING WORKS

8A. Structures

FEDERAL POWER COMM'N V OREGON (FEDERAL POWER PROJECT).
For primary bibliographic entry see Field 06E.
W69-06893

BOWES V CITY OF CHICAGO (INTERFERENCE WITH NAVIGATION BY CONSTRUCTION OF FILTRATION PLANT).
For primary bibliographic entry see Field 06E.
W69-06914

BURKHARDT V UNITED STATES (CONGRESSIONAL AUTHORITY TO PAY DEBTS NOT OTHERWISE PROVIDED FOR IN LAW).
For primary bibliographic entry see Field 06E.
W69-06917

RIGHTS, POWERS, DUTIES, MUNICIPALITIES.
For primary bibliographic entry see Field 06C.
W69-06935

PUBLIC USES FOR WHICH PRIVATE PROPERTY MAY BE TAKEN OR DAMAGED.
For primary bibliographic entry see Field 06E.
W69-06938

BRIDGE CONSTRUCTION AND MAINTENANCE.
For primary bibliographic entry see Field 06E.
W69-07055

8C. Hydraulic Machinery

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For primary bibliographic entry see Field 06E.
W69-07259

8I. Fisheries Engineering

FISH AND GAME LAWS--FISHWAYS IN DAMS.
For primary bibliographic entry see Field 06E.
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09. MANPOWER, GRANTS AND FACILITIES

9D. Grants, Contracts, and Research Act Allotments

LEGAL RESEARCH IN WATER RESOURCES,
Office of Water Resources Research, Washington, D. C.
Roland R. Renne, and Glen D. Fulcher.
Land and Water L Rev, Vol 4, No 1, pp 145-158, 1969. 14 p, 12 ref.

Descriptors: *Water resources research act, *Water law, *Institutions, Legislation, Allotments, Universities, Water rights, Research facilities, Water resources development, Programs, Projects, Legal aspects, Future planning (Projected), Long term planning, Administration.

The Water Resources Research Act of 1964 established an Office of Water Resources Research and authorizes various institutions, firms, and agencies to carry out water research. The purpose of the research programs is to supplement and strengthen the total national water research effort. There are 4201 recorded projects underway, of which 3016 are federally supported and 735 are established under the 1964 Act. The research is grouped under 9 categories and 44 subcategories. Water law research is grouped under the Water Resources Planning category and is a study of water law looking toward changes to improve use efficiency and investigation of institutional structures influencing decisions on water. The content of legal research is divided generally among legal aspects, legislation, water rights, and water law. 3 tables show: (1) distribution of legal research by category; (2) the disciplines involved in water law research; (3) the organizations supporting legal research. Among the benefits from legal research are books and legislation. Promising research areas include: regional water development, weather modification, ground water pollution, thermal pollution, water rights and integration of surface and ground water use. The author concludes that future legal research should be oriented toward a more comprehensive approach, calling for interdisciplinary and interregional research. (Helwig-Fla)
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